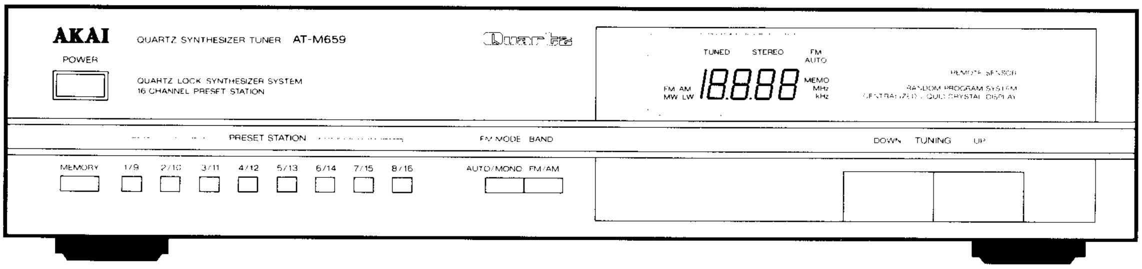
AKAI SERVICE MANUAL


AKAI
QUARTZ SYNTHESIZER TUNER AT-M659
Quartz
POWER
QUARTZ LOCK SYNTHESIZER SYSTEM
16 CHANNEL PRESET STATION
TUNED
STEREO
FM AUTO
FM AM
MW LW
18.8.88
MEMO
MHz
kHz
REMOTE SENSOR
RANDOM PROGRAM SYSTEM
CENTRALIZED LIQUID CRYSTAL DISPLAY
PRESET STATION
FM MODE
BAND
DOWN
TUNING
UP
MEMORY
1/9
2/10
3/11
4/12
5/13
6/14
7/15
8/16
AUTO/MONO
FM/AM

QUARTZ SYNTHESIZER TUNER

MODEL AT-M459/L
MODEL AT-M659/L

SPECIFICATIONS

FM TUNER SECTION

Tuning frequency range	87.5 MHz~108 MHz
Usable sensitivity	18.0 dBf
Quieting sensitivity	
Mono	21.0 dBf
Stereo	42.0 dBf
Capture ratio	2.0 dB
Selectivity	65 dB
Image rejection	45 dB
IF rejection	75 dB
Spurious rejection	80 dB
AM suppression	53 dB
S/N (IHF)	
Mono	70 dB
Stereo	65 dB
T.H.D.	
Mono	0.2%
Stereo	0.5%
Stereo separation (1 kHz)	35 dB
Frequency response	30 Hz~15 kHz ±1.0 dB
Output level	730 mV/2 k ohms (100% Mod.)

AM TUNER SECTION

Tuning frequency range	MW
(for US & Canada)	530 kHz~1,610kHz
(for others)	531 kHz~1,602 kHz
Usable sensitivity	400 μV/m
Selectivity	35 dB
Image rejection	30 dB
IF rejection	45 dB
S/N	30 dB
Output level	220 mV/2 k ohms (30% Mod.)

LW SECTION (AT-M459L, M659L only)

Tuning frequency range	
(for US & Canada)	—
(for others)	144 kHz~351 kHz
Usable sensitivity	800 μV/m
Selectivity	30 dB
Image rejection	30 dB
IF rejection	30 dB
S/N	30 dB
Output level	220 mV/2 kohms (30% Mod.)
Power requirements	220 V, 50 Hz for Europe except UK 240 V, 50 Hz for UK and Australia 110 V-120 V/220 V-240 V, 50 Hz/60 Hz Convertible for other countries
Dimensions	
AT-M459/L	350 (W) × 81 (H) × 360 (D) mm (13.8 × 3.2 × 14.0 inches)
AT-M659/L	350 (W) × 82 (H) × 360 (D) mm (13.8 × 3.2 × 14.0 inches)
Weight	
AT-M459/L	2.7 kg (5.9 lbs)
AT-M659/L	2.8 kg (6.2 lbs)

Standard accessories

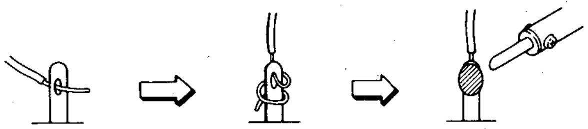
Connection cord	RCA pin cord × 1
FM Dipole antenna	× 1
FM Plug adaptor	× 1
AM Loop antenna	× 1

* For improvement purposes, specifications and design are subject to change without notice.

★SAFETY INSTRUCTIONS

PRECAUTIONS DURING SERVICING

1. Parts identified by the ⚠(*) symbol parts are critical for safety. Replace only with parts number specified.
2. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation.
   These must also be replaced only with specified replacements.
   Examples: RF converters, tuner units, antenna selector switches, RF cables, noise blocking capacitors, noise blocking filters, etc.
3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads
4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers (Insulating Barriers)
   4) Insulation sheets for transistors
   5) Plastic screws for fixing microswitch (especially in turntable)
5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.



6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).
7. Check that replaced wires do not contact sharp edged or pointed parts.
8. Also check areas surrounding repaired locations.
9. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

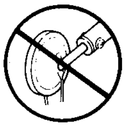
SAFETY CHECK AFTER SERVICING

Confirm the specified insulation resistance between power cord plug prongs and externally exposed parts of the set is greater than 10 M ohms. but for equipment with external antenna terminals (tuner, receiver, etc.) and is intended for C or A, specified insulation resistance should be headphone jacks line-in-out jacks etc. more than 2.2 M ohms (ground terminals, microphone jacks).

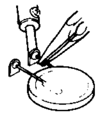
PRECAUTIONS FOR LITHIUM BATTERY

The lithium battery may explode when heated excessively.
[OBSERVE THE FOLLOWING WHEN REPLACING]

- Replace with the same make and type only.
- Use soldering iron in "recommended way" only.
- Place battery in correct polarity.
- Do not short the terminals.
- Do not recharge battery.
- Do not dispose of battery in fire.



[DANGER]



[RECOMMENDED WAY]

★INFORMATION

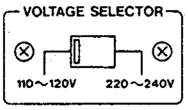
SYMBOLS FOR PRIMARY DESTINATION

Alphabet indicates the destination of the units as listed below.

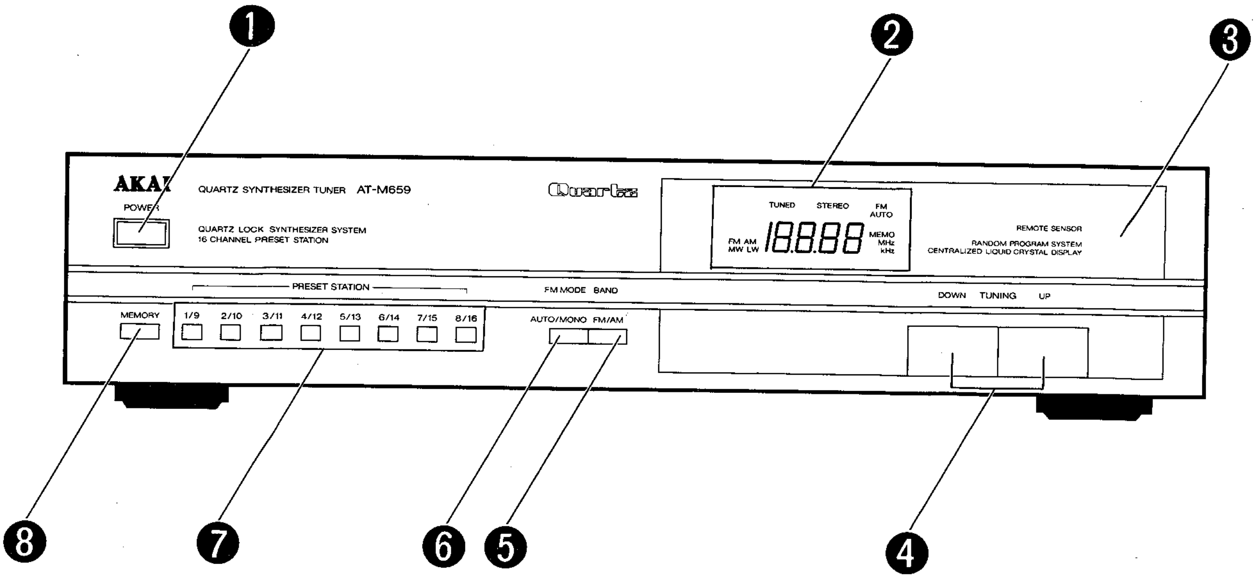
Symbols	Principal Destinations
A	USA
B	UK
C	Canada
E	Europe (except UK)
J	Japan
S	Australia
V	W. Germany only
U	Universal Area
Y*	Custom version

VOLTAGE CONVERSION (U Model only)

Before connecting the power cord. SET the VOLTAGE SELECTOR located on the rear panel with a screwdriver so that the correct voltage is indicated.



I. CONTROLS


❶
❷
❸
AKAI
QUARTZ SYNTHESIZER TUNER AT-M659
POWER
QUARTZ LOCK SYNTHESIZER SYSTEM
16 CHANNEL PRESET STATION
TUNED
STEREO
FM AUTO
FM AM
MW LW
18888
MEMO
MHz
kHz
REMOTE SENSOR
RANDOM PROGRAM SYSTEM
CENTRALIZED LIQUID CRYSTAL DISPLAY
PRESET STATION
FM MODE
BAND
DOWN
TUNING
UP
MEMORY
1/9
2/10
3/11
4/12
5/13
6/14
7/15
8/16
AUTO/MONO
FM/AM
❽
❼
❻
❺
❹

❶ **POWER Button**
To turn the power on and off.

❷ **LC (Liquid Crystal) Display**
Indicates the tuner mode.

❸ **REMOTE SENSOR Window**
Receives the signals from the RC-S659 remote control unit (Included with the AM-M659).

❹ **TUNING UP and DOWN Buttons**
For tuning in stations manually.

❺ **BAND Button**
To select the band (FM/AM).

❻ **FM MODE Button**
To select between stereo and monaural reception when tuning in FM stations.

❼ **PRESET STATION Buttons (1—8/9—16)**
For memorizing stations and recalling memorized stations.

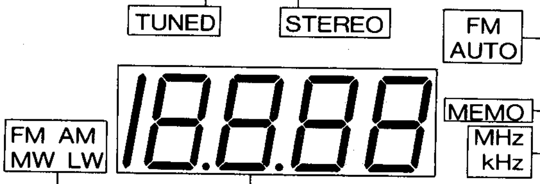
❽ **MEMORY Button**
Stores stations in the preset memory. Press the button once to preset stations at numbers 1 to 8, and twice to preset stations at numbers 9 to 16.

On the LC Display

TUNED Indicator
Tells you a station is properly tuned in.

STEREO Indicator
Tells you the tuned in FM station is being broadcast in stereo.

FM AUTO Indicator
Tells you the FM MODE button is set to AUTO.


TUNED
STEREO
FM AUTO
FM AM
MW LW
18888
MEMO
MHz
kHz

Band Indicator (AM/FM for AT-M659, LW/MW/FM for AT-M659L)
Tells you which band is selected.

Digital display
Tells you the tuned in frequency or the preset station number.

Frequency Indicators (kHz/ MHz)
Tells you the unit of the tuning frequency.

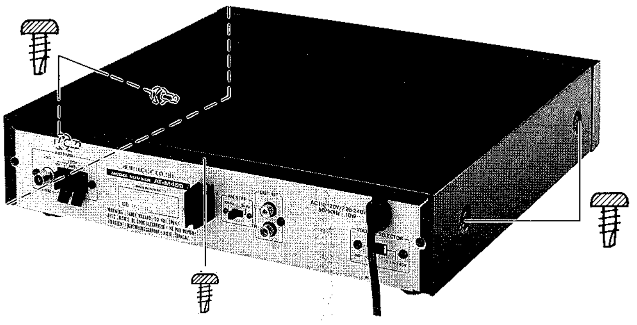
MEMO Indicator
Tells you the tuner is ready to store a station in the memory.

II. DISASSEMBLY

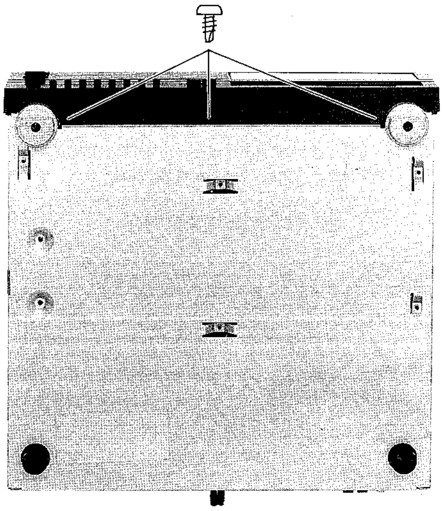
In case of trouble, etc. necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.

* Photographs employed in this paragraphs are model AT-M459.

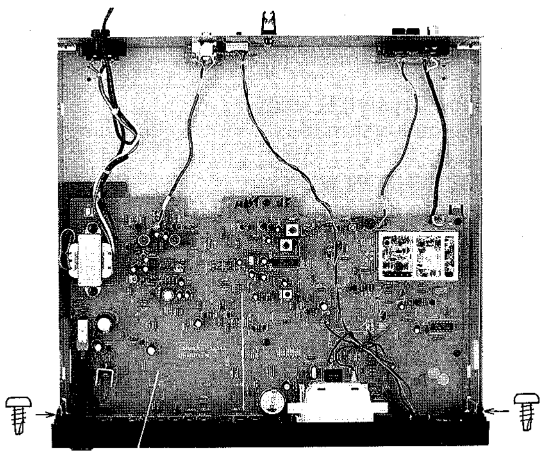
1. Removal of UPPER COVER



2. Removal of FRONT PANEL



3.



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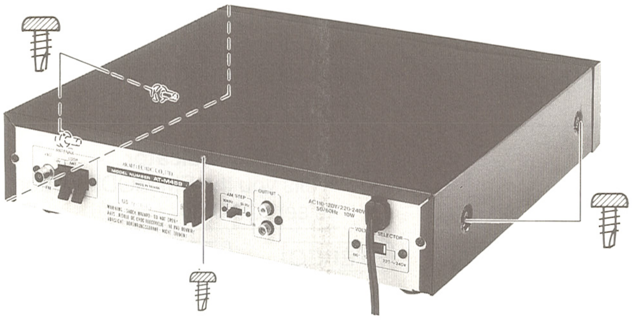
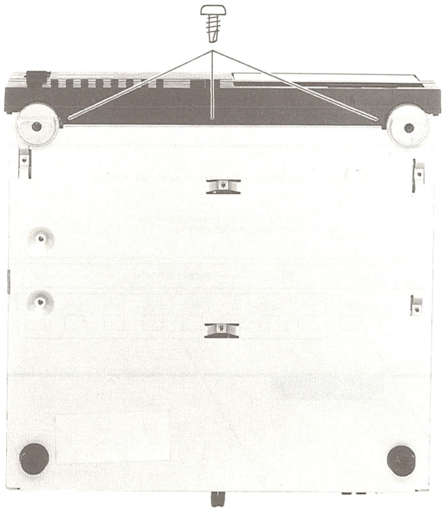
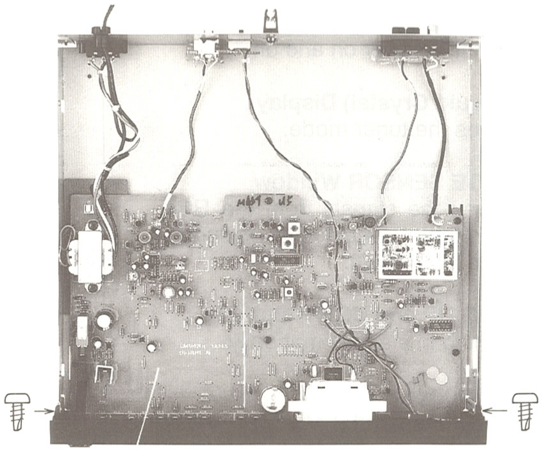


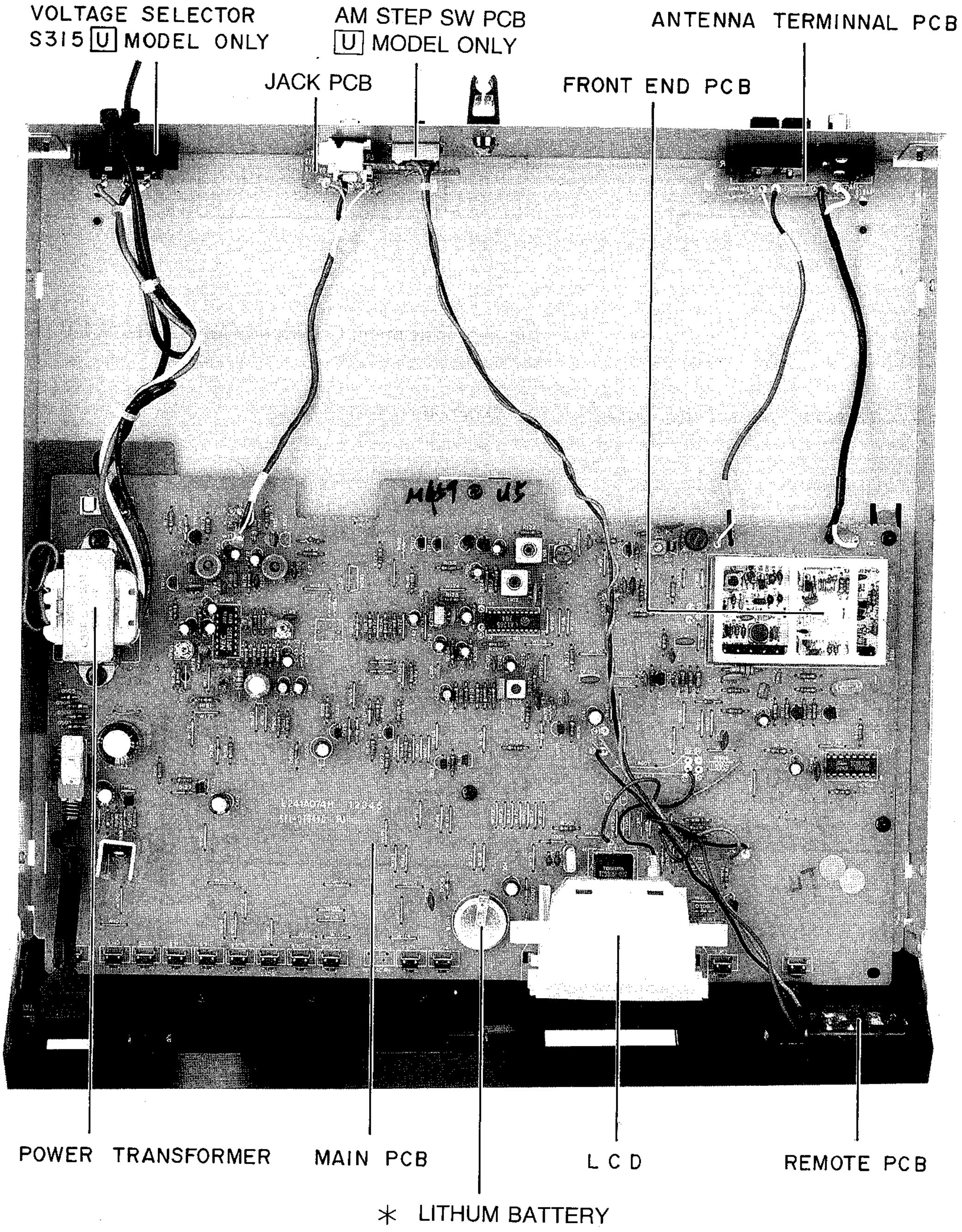
2. Removal of FRONT PANEL



3.

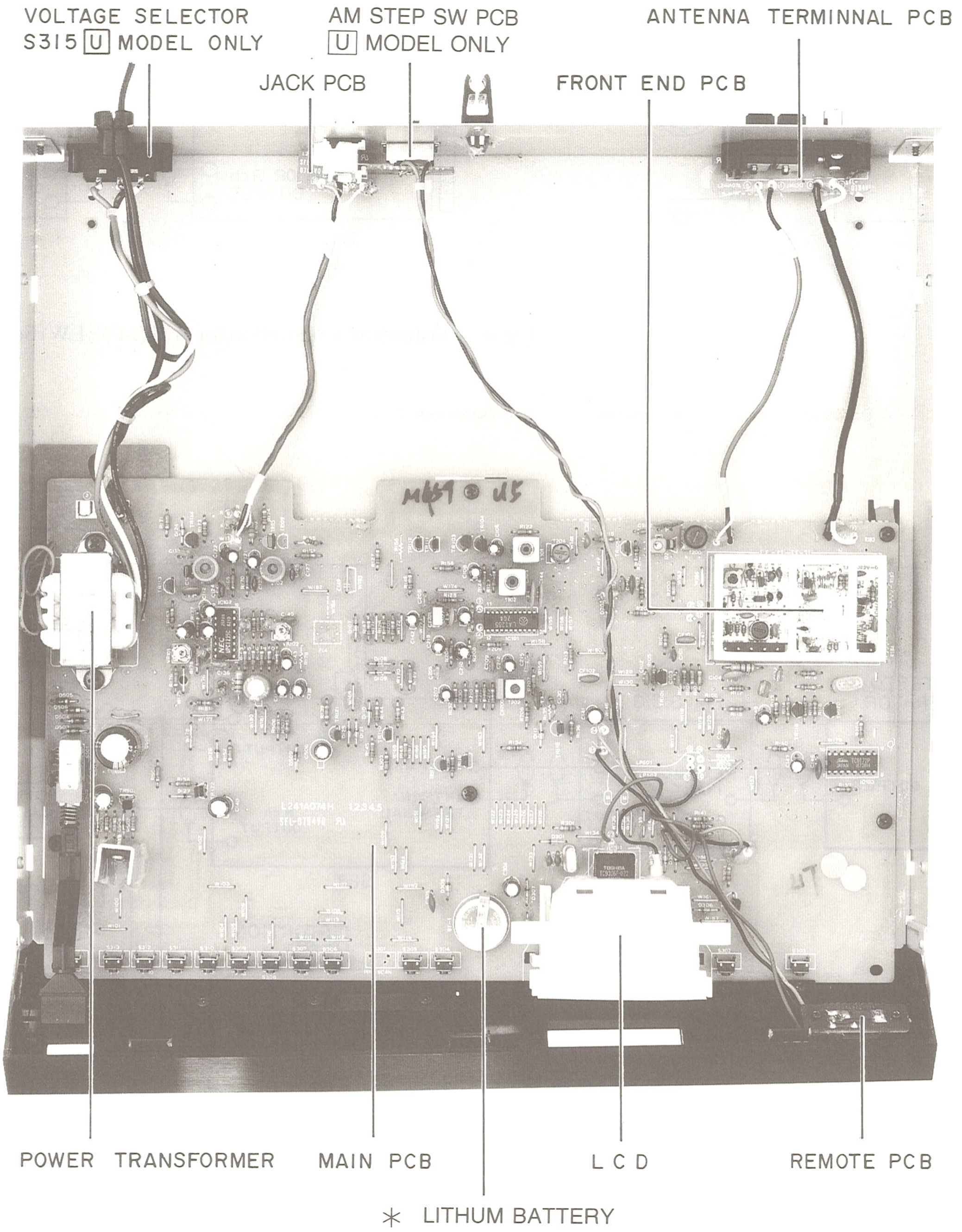


III. PRINCIPAL PARTS LOCATION


VOLTAGE SELECTOR
S315 U MODEL ONLY
AM STEP SW PCB
U MODEL ONLY
ANTENNA TERMINNAL PCB
JACK PCB
FRONT END PCB
POWER TRANSFORMER
MAIN PCB
L C D
REMOTE PCB
* LITHUM BATTERY

* WHEN REPLACEMENT IS NEEDED SEE SAFETY INSTRUCTIONS.

III. PRINCIPAL PARTS LOCATION


VOLTAGE SELECTOR
S315 U MODEL ONLY
AM STEP SW PCB
U MODEL ONLY
ANTENNA TERMINNAL PCB
JACK PCB
FRONT END PCB
POWER TRANSFORMER
MAIN PCB
L C D
REMOTE PCB
* LITHUM BATTERY

* WHEN REPLACEMENT IS NEEDED
SEE SAFETY INSTRUCTIONS.

IV. ADJUSTMENT

4-1. INSTRUMENT CONNECTIONS

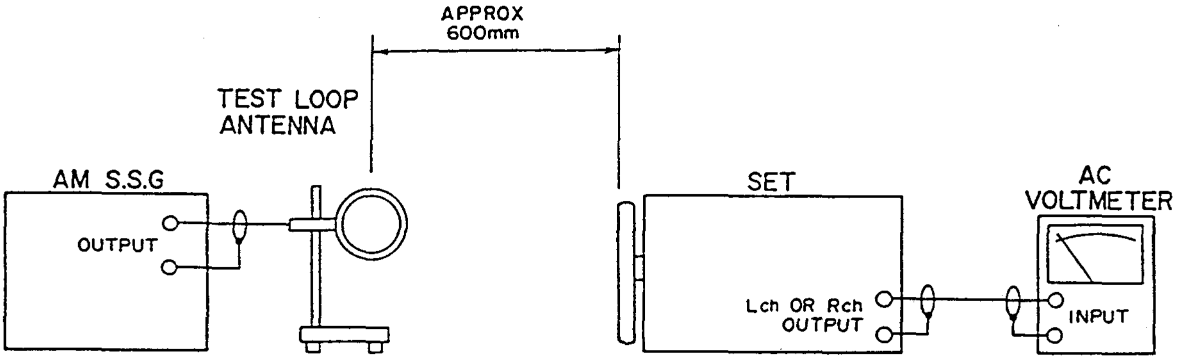

APPROX
600mm
TEST LOOP
ANTENNA
AM S.S.G
OUTPUT
SET
Lch OR Rch
OUTPUT
AC
VOLTMETER
INPUT

Fig. 4-1 Instrument Connection for AM (MW, LW) Section Adjustment

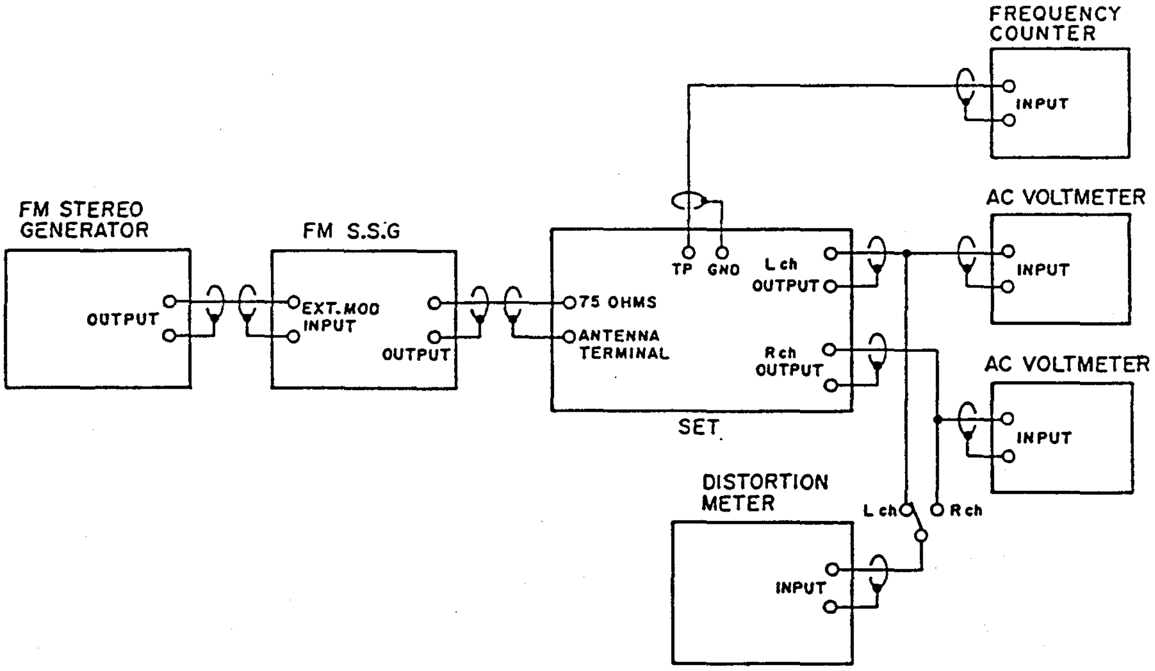

FREQUENCY
COUNTER
INPUT
FM STEREO
GENERATOR
OUTPUT
FM S.S.G
EXT.MOD
INPUT
OUTPUT
TP
GND
Lch
OUTPUT
75 OHMS
ANTENNA
TERMINAL
Rch
OUTPUT
SET
AC VOLTMETER
INPUT
AC VOLTMETER
INPUT
DISTORTION
METER
INPUT
Lch
Rch

Fig. 4-2 Instrument Connection for FM Section Adjustment

4-2. ADJUSTMENT

NOTE: 1. Set the S.S.G. to 1 kHz, 75 kHz deviation for U, S model, 1 kHz 40 kHz deviation for B, E or V model.
2. Confirm that the Sensitivity margin between Low and High range sensitivities is within 3 dB, otherwise readjust Low and High range sensitivity.

STEP	ADJUSTMENT ITEM
	1. SSG FREQ. & OUTPUT LEVEL 2. SET Tuning FREQ. 3. ADJ. Part 4. Result & Remarks

Adjustment Part →

Test Point - - - →

AM

NOTE: 1. Set the S.S.G to 1 kHz 30% modulation of each.
NOTE: 2. Frequencies indicated in < > are the model for 10 kHz step.

3 | AM IF
1. 603 kHz <600 kHz>, 74 dBμ
2. 603 kHz <600 kHz>
3. T202
4. · Connect the milli-voltmeter to OUTPUT.
   · Maximum output level.

* For the model AT-M459L, M659L

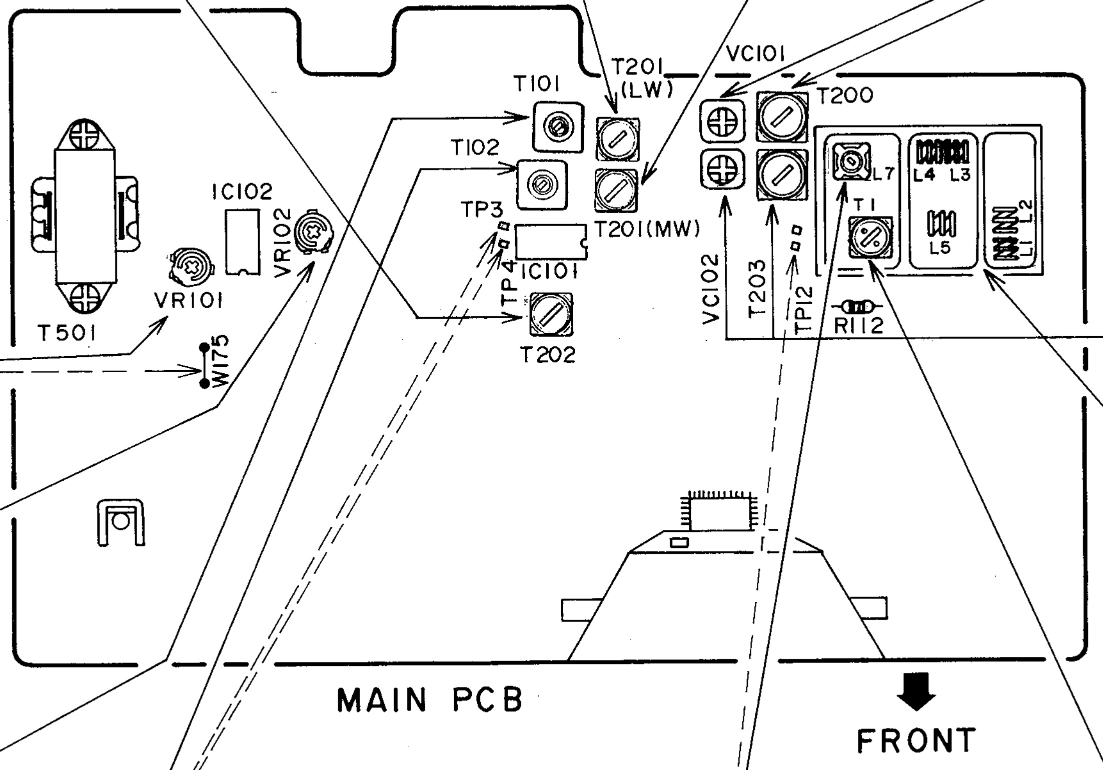
1 | LW OSC
1. —
2. 350 kHz
3. T204
4. · Connect the Digital DC Voltmeter between TP12 and GND.
   · 8.2 ± 0.1 V.

1 | AM (MW) OSC
1. —
2. 1,404 kHz <1,400 kHz>
3. T201
4. · Connect the Digital DC Voltmeter between TP12 and GND.
   · 6.7 ± 0.1 V.

2 | AM (MW) SENSITIVITY
1. 603 kHz <600 kHz>, 70 dBμ (Low) or 1,404 kHz <1,400 kHz>, 70 dBμ (High)
2. 603 kHz <600 kHz> (Low)
   1,404 kHz <1,400 kHz> (High)
3. T200 (Low), VC101 (High)
4. · Connect a milli-voltmeter to OUTPUT.
   · Maximum output level.
   * For best result, repeat Low a High adjustments several times.

* For the model AT-M459L, M659L

2 | LW SENSITIVITY
1. 106 kHz, 70 dBμ (Low) or
   300 kHz, 70 dBμ (High)
2. 160 kHz (Low) or 300 kHz (High)
3. T203 (Low), VC102 (High)
4. · Connect a milli-voltmeter to OUTPUT.
   · Maximum output level.
   * For best result, repeat Low and High adjustments several times.



FM

5 | MPX FREE RUNNING
1. —
2. —
3. VR101 & W175
4. · Connect the Frequency counter to W175.
   · 19 kHz ± 50 Hz

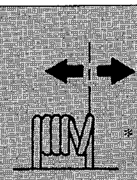
6 | STEREO SEPARATION
1. 98.0 MHz, 60 dBμ (STEREO L or R channel only)
2. 98.0 MHz
3. VR102
4. · Connect the milli-voltmeter to OUTPUT.
   · Minimum output level for opposite channel).

4 | DISTORTION (MONO)
1. 87.5 MHz, 60 dBμ (MONO)
2. 87.5 MHz
3. T101
4. · Connect the distortion meter to OUTPUT.
   · Minimum Distortion.

3 | CENTER VOLTAGE
1. —
2. 87.5 MHz
3. T102
4. · Connect the DC Digital Voltmeter between TP3 and TP4.
   · 0 ± 50 mV.

1 | FM OSC
1. —
2. 87.5 MHz
3. L7 (FRONT END)
4. · Connect the DC Digital Voltmeter between TP12 and GND.
   · DC 3.4 ± 0.05 V.

7 | DISTORTION (STEREO)
1. 98.0 MHz, 60 dBμ (STEREO L or R channel only)
2. 98.0 MHz
3. T1 (FRONT END)
4. · Connect the distortion meter to OUTPUT.
   · Minimum Distortion.



* ADJUSTMENT METHOD OF L2, L4

2 | FM SENSITIVITY
1. Low: 87.5 MHz, High: 108.0 MHz
   (MONO) 15 dBμ
2. Low: 87.5MHz, High: 108.0 MHz
3. L2, L4 (FRONT END)
4. · Connect the distortion meter to OUTPUT.
   · Minimum Distortion
   * For the best result repeat Low and High adjustments several times.

V. PARTS LIST

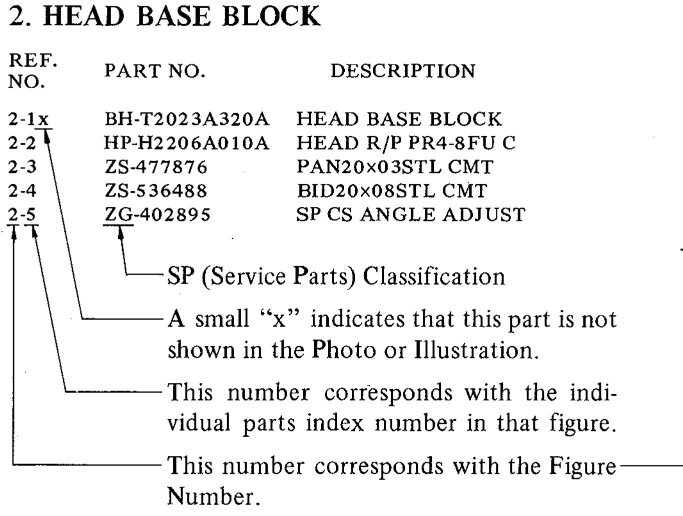
ATTENTION

1. When placing an order for parts, be sure to list Part No., Model No. and the description of each part. Otherwise, the non-delivery of the part or the delivery of a wrong part may result.
2. Please make sure that Part No. is correct when ordering. If not, a part different from the one you ordered may be delivered.
3. Since the parts shown in Parts List of Preliminary Service Manual may have been the subject of changes, please use this Parts List for all future reference.

HOW TO USE THIS PARTS LIST

1. This Parts List lists those parts which are considered necessary for repairs. Other common parts, such as resistors and capacitors, are listed in the "Common List for Service Parts" from which these parts should be selected and stocked.
2. The Recommended Spare Parts List shows those parts in the Parts List which are considered particularly important for service.
3. Parts not shown in the Parts List and "Common List for Service Parts" will not in principle be supplied.
4. How to read the Parts List.

a) Mechanism Block



2. HEAD BASE BLOCK

REF. NO.	PART NO.	DESCRIPTION
2-1x	BH-T2023A320A	HEAD BASE BLOCK
2-2	HP-H2206A010A	HEAD R/P PR4-8FU C
2-3	ZS-477876	PAN20×03STL CMT
2-4	ZS-536488	BID20×08STL CMT
2-5	ZG-402895	SP CS ANGLE ADJUST

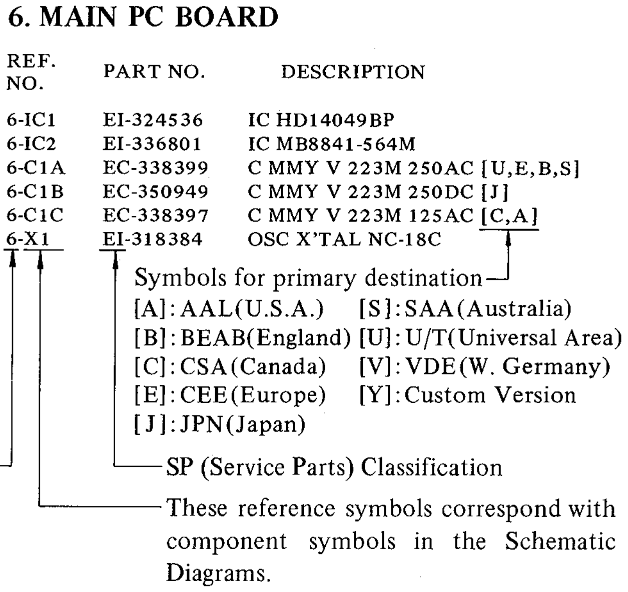
SP (Service Parts) Classification

A small "x" indicates that this part is not shown in the Photo or Illustration.

This number corresponds with the individual parts index number in that figure.

This number corresponds with the Figure Number.

b) PC Board



6. MAIN PC BOARD

REF. NO.	PART NO.	DESCRIPTION
6-IC1	EI-324536	IC HD14049BP
6-IC2	EI-336801	IC MB8841-564M
6-C1A	EC-338399	C MMY V 223M 250AC [U,E,B,S]
6-C1B	EC-350949	C MMY V 223M 250DC [J]
6-C1C	EC-338397	C MMY V 223M 125AC [C,A]
6-X1	EI-318384	OSC X'TAL NC-18C

Symbols for primary destination

[A]: AAL(U.S.A.)
[B]: BEAB(England)
[C]: CSA(Canada)
[E]: CEE(Europe)
[J]: JPN(Japan)
[S]: SAA(Australia)
[U]: U/T(Universal Area)
[V]: VDE(W. Germany)
[Y]: Custom Version

SP (Service Parts) Classification

These reference symbols correspond with component symbols in the Schematic Diagrams.

The available PC Board Blocks are listed separately.

5. When Part No. is known, Parts Index at end of Parts List can be used to locate where that part is shown in Parts List by its Reference No. listed at right of Part No.

WARNING

⚠ (∗) INDICATES SAFETY CRITICAL COMPONENTS. FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURE'S RECOMMENDED PARTS.

AVERTISSEMENT

⚠ (∗) IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÉCES RECOMMANDEES PAR LÉ FABRICANT.

1. RECOMMENDED SPARE PARTS

Ref. No.	Part No.	Description
1	∗BT-725479T	TRANS POW AT-M459(B,S) [B,S]
2	∗BT-725478T	TRANS POW AT-M459(E,V) [E,V]
3	∗BT-725480T	TRANS POW AT-M459(U) [U]
4	ED-301911	D SILICON H DS448
5	∗ED-570295	D SILICON 1N4003 200/1.0A
6	ED-349460-A	D VARACTOR SVC321SPA ABCD DBL
7	ED-349448	D VARACTOR 1SV147
8	∗ED-381066J	D ZENER H HZ15E-B1
9	∗ED-381065J	D ZENER H HZ15E-B3
10	ED-381064J	D ZENER H HZ5.6E-B3
11	EH-344434	FILTER CE BFU450C4N 0.450MHZ
12	EH-715258	FILTER CE CFM2-450BL
13	EH-725490T	FILTER CE SK10.7M2
14	EH-724646T	FILTER LC LP L351Y016(FB-7DG) [V]
15	EI-383530J	IC BX-1407
16	EI-361624	IC LA1265
17	EI-332203	IC TC4528BP
18	EI-363289	IC TC9172P
19	EI-383733J	IC TC9306F-022
20	EI-351849	IC UPC1235C
21	EI-344422	OSC X'TAL HC-18/U 7.200MHZ
22	EM-382120J	IND LCD 9437MJP
23	∗ES-725487T	SW PUSH [POWER SW]
24	∗ES-725477T	SW SLIDE [U] [S502][VOLTAGE SELECTOR]
25	ES-724644T	SW SLIDE J-S5029#01 02-02N [U] [AM STEP SW]
26	ES-720639	SW TACT SKHHLH1520-CL [TUNING DOWN]
27	ET-353734	TR FET 2SJ103 GR,BL
28	ET-349449	TR FET 2SK161 O,Y
29	ET-349458	TR FET 2SK192A Y
30	ET-337759	TR FET 2SK246 GR
31	ET-353899	TR 2SA1317 S,T,U
32	ET-308141	TR 2SC2603 G F05
33	ET-338410	TR 2SC2878 A,B [L ONLY]
34	ET-336869	TR 2SC2999 C,D
35	ET-349081	TR 2SC3383 S,T
36	ET-356437	TR 2SC930 D2,E,F
37	ET-328265	TR 2SC930 F
38	∗ET-349459	TR 2SD1406 O,Y,GR
39	∗EZ-358816	BATTERY LITHIUM BR2032-1HF

2. P.C BOARD BLOCK

Ref. No.	Part No.	Description
1A	BA-725644T	PC MAIN BLK AT-M459(U) [U]
1B	BA-725642T	PC MAIN BLK AT-M459(E) [E]
1C	BA-725641T	PC MAIN BLK AT-M459(V) [V]
1D	BA-725643T	PC MAIN BLK AT-M459(S) [S]
1E	BA-725603T	PC MAIN BLK AT-M459L(E) [E]
1F	BA-725602T	PC MAIN BLK AT-M459L(B) [B]
2A	BA-F0131A010A	PC FRONTENDBLKFE31(U,C,A,S,E,B [U,E,B,S]
2B	BA-F0141A010B	PC FRONT END BLK FE41(V) [V]

3. MAIN P.C BOARD

Ref. No.	Part No.	Description
BT1	∗EZ-358816	BATTERY LITHIUM BR2032-1HF
CF101	EH-725490T	FILTER CE SK10.7M2
CF102	EH-725490T	FILTER CE SK10.7M2
CF200	EH-715258	FILTER CE CFM2-450BL
CF201	EH-344434	FILTER CE BFU450C4N 0.450MHZ
D108	ED-301911	D SILICON H DS448
D109	ED-301911	D SILICON H DS448
D111	ED-301911	D SILICON H DS448
D121	ED-301911	D SILICON H DS448
D124	ED-301911	D SILICON H DS448
D125	ED-301911	D SILICON H DS448
D126	ED-301911	D SILICON H DS448
D127	ED-301911	D SILICON H DS448
D201	ED-349460-A	D VARACTOR SVC321SPA ABCD DBL
D202	ED-349460-A	D VARACTOR SVC321SPA ABCD DBL
D203	ED-301911	D SILICON H DS448 [L ONLY]
D204	ED-301911	D SILICON H DS448 [L ONLY]
D205	ED-301911	D SILICON H DS448 [L ONLY]
D206	ED-301911	D SILICON H DS448 [L ONLY]
D301	ED-301911	D SILICON H DS448
D302	ED-301911	D SILICON H DS448 [L ONLY]
D303	ED-301911	D SILICON H DS448
D304	ED-301911	D SILICON H DS448
D305	ED-301911	D SILICON H DS448
D306	ED-301911	D SILICON H DS448
D307	ED-301911	D SILICON H DS448
D308	ED-301911	D SILICON H DS448
D309	ED-301911	D SILICON H DS448
D310	ED-301911	D SILICON H DS448
D311	ED-301911	D SILICON H DS448
D312	ED-301911	D SILICON H DS448
D313	ED-301911	D SILICON H DS448
D314	ED-301911	D SILICON H DS448
D315	ED-301911	D SILICON H DS448
D316	ED-301911	D SILICON H DS448
D503	∗ED-570295	D SILICON 1N4003 200/1.0A
D504	∗ED-570295	D SILICON 1N4003 200/1.0A
D505	∗ED-570295	D SILICON 1N4003 200/1.0A
D506	∗ED-570295	D SILICON 1N4003 200/1.0A
D507	∗ED-381066J	D ZENER H HZ15E-B1
D508	∗ED-381065J	D ZENER H HZ15E-B3
D509	ED-381064J	D ZENER H HZ5.6E-B3
FL301	EM-382120J	IND LCD 9437MJP
FL4	EH-724646T	FILTER LC LP L351Y016(FB-7DG) [V]
IC101	EI-361624	IC LA1265
IC102	EI-351849	IC UPC1235C
IC103	EI-363289	IC TC9172P
IC301	EI-383733J	IC TC9306F-022
IC302	EI-332203	IC TC4528BP
LP501	EL-725774T	PL CORD 12.0V 150MA
L101	EO-337523	COIL FIX 1 TL-8 223J
L102	EO-337523	COIL FIX 1 TL-8 223J
L103	EO-336934	COIL FIX 1 LAL03KH 2R2M
R107	ER-306805	R CB H S15 FS RDS 1/2W 101J
R150	ER-306805	R CB H S15 FS RDS 1/2W 101J
S301	ES-720639	SW TACT SKHHLH1520-CL [PRE SCAN][L ONLY]
S302	ES-720639	SW TACT SKHHLH1520-CL [TUNING DOWN]
S303	ES-720639	SW TACT SKHHLH1520-CL [TUNING UP]
S304	ES-720639	SW TACT SKHHLH1520-CL [FM/AM]
S305	ES-720639	SW TACT SKHHLH1520-CL [AUTO/MONO]
S306	ES-720639	SW TACT SKHHLH1520-CL [8/16]
S307	ES-720639	SW TACT SKHHLH1520-CL [7/15]

Ref. No.	Part No.	Description
S308	ES-720639	SW TACT SKHHLH1520-CL [6/14]
S309	ES-720639	SW TACT SKHHLH1520-CL [5/13]
S310	ES-720639	SW TACT SKHHLH1520-CL [4/12]
S311	ES-720639	SW TACT SKHHLH1520-CL [3/11]
S312	ES-720639	SW TACT SKHHLH1520-CL [2/10]
S313	ES-720639	SW TACT SKHHLH1520-CL [1/9]
S314	ES-720639	SW TACT SKHHLH1520-CL [MEMORY]
S501	*ES-725487T	SW PUSH [POWER SW]
TR101	ET-356437	TR 2SC930 D2,E,F
TR102	ET-338410	TR 2SC2878 A,B [L ONLY]
TR103	ET-349081	TR 2SC3383 S,T
TR104	ET-349081	TR 2SC3383 S,T
TR105	ET-349458	TR FET 2SK192A Y
TR106	ET-308141	TR 2SC2603 G F05 [L ONLY]
TR107	ET-308141	TR 2SC2603 G F05 [L ONLY]
TR109	ET-353734	TR FET 2SJ103 GR,BL
TR113	ET-353899	TR 2SA1317 S,T,U
TR114	ET-349081	TR 2SC3383 S,T
TR115	ET-349081	TR 2SC3383 S,T
TR116	ET-353899	TR 2SA1317 S,T,U
TR117	ET-308141	TR 2SC2603 G F05
TR118	ET-353899	TR 2SA1317 S,T,U
TR119	ET-349081	TR 2SC3383 S,T
TR120	ET-337759	TR FET 2SK246 GR
TR121	ET-308141	TR 2SC2603 G F05
TR122	ET-353899	TR 2SA1317 S,T,U
TR301	ET-353899	TR 2SA1317 S,T,U [U]
TR302	ET-353899	TR 2SA1317 S,T,U
TR501	*ET-308141	TR 2SC2603 G F05
TR502	*ET-349459	TR 2SD1406 O,Y,GR
T101	EO-725494T	COIL FM
T102	EO-725495T	COIL FM
T200A	EO-725498T	COIL ANT MW
T200B	EO-725612T	COIL MW [L ONLY]
T201	EO-725610T	COIL OSC MW
T202	EO-725496T	COIL IFT AM
T203	EO-725613T	COIL LW [L ONLY]
T204	EO-725611T	COIL OSC LW [L ONLY]
T501A	*BT-725480T	TRANS POW AT-M459(U) [U]
T501B	*BT-725478T	TRANS POW AT-M459(E,V) [E,V]
T501C	*BT-725479T	TRANS POW AT-M459(B,S) [B,S]
VC101	EC-363331	C S-FIX H CTC-6U-030 5.5-30
VC102	EC-363331	C S-FIX H CTC-6U-030 5.5-30 [L ONLY]
VR101	EV-371281	R S-FIX H VM6CKPVB 0.30W 502
VR102	EV-351189	R S-FIX H VM6CKPVB 0.30W 504
X301	EI-344422	OSC X'TAL HC-18/U 7.200MHZ

4. FRONT END P.C BOARD

Ref. No.	Part No.	Description
D1	ED-349448	D VARACTOR 1SV147
D2	ED-349448	D VARACTOR 1SV147
D3	ED-349448	D VARACTOR 1SV147 [V]
D4	ED-349448	D VARACTOR 1SV147
L1	EO-349461	COIL FIX 2 LINK
L2	EO-349462	COIL FIX 2 U147
L3	EO-349461	COIL FIX 2 LINK
L4	EO-349462	COIL FIX 2 U147
L5	EO-349462	COIL FIX 2 U147 [V]
L6	EO-359056	COIL FIX 1 LALO3NA 2R2M
L7	EO-353687	COIL OSC 2 E525HN-110003
T1	EO-337640	COIL IFT 119AC-15533X 10.7MHZ
TR1	ET-349449	TR FET 2SK161 O,Y
TR2	ET-336869	TR 2SC2999 C,D
TR3	ET-328265	TR 2SC930 F
TR4	ET-349449	TR FET 2SK161 O,Y

5. ANTENNA TERMINAL P.C BOARD

Ref. No.	Part No.	Description
JM100	EJ-359031	TERMINAL LEVER YKD31-0215 P 2P [ANTENNA TERNINAL]

6. AM STEP SW P.C BOARD

Ref. No.	Part No.	Description
S315	ES-724644T	SW SLIDE J-S5029#01 02-02N [U] [AM STEP SW]

7. JACK P.C BOARD

Ref. No.	Part No.	Description
JM101	EJ-725461T	PIN J 2P [LINE OUT]

8. REMOTE P.C BOARD

Ref. No.	Part No.	Description
IC1	EI-383530J	IC BX-1407

9. FINAL ASSEMBLY BLOCK

Ref. No.	Part No.	Description
1	SP-725660J	COVER UPPER AT (S.P)
2	ZS-322580	ST BID40X08STL BNI
3	ZS-305827	ST BID30X06STL BNI
4A	*EW-374894	AC CORD 2C VM-0129A,VFF U/T [U]
4B	*EW-347897	AC CORD 2 CORES VM0364,LCFL EV [E,V]
4C	*EW-346249	AC CORD 2 CORES LCFL2X0.75 B [B]
4D	*EW-347898	AC CORD 2 CORES VM-0436,LCFL S [S]
5	*EZ-371605	BUSH CORD 2271
6	SZ-720585	HOLDER ANTENNA
7	ZS-305827	ST BID30X06STL BNI
8	ZS-354403	ST BR30X08STL BNI
9	ZS-539741	PAN20X04STL BNI
10	*ES-725477T	SW SLIDE [U] [S502][VOLTAGE SELECTOR]
11	MZ-725615T	JOINT POWER
12	SA-725458T	FOOT (ABS)
13	SA-725452T	CUSHION FOOT (GUM)
14	ZS-305827	ST BID30X06STL BNI
15A	BD-725638T	PANEL FRONT BLK AT-M459-B
15B	BD-725601T	PANEL FRONT BLK AT-M459L-B
15C	BD-725617T	PANEL FRONT BLK AT-M659-B
15D	BD-725616T	PANEL FRONT BLK AT-M659L-B
16	SK-725482T	KNOB POWER-B
17	SK-725639T	KNOB PRE-SET-B
18	SK-725640T	KNOB TUNING-B

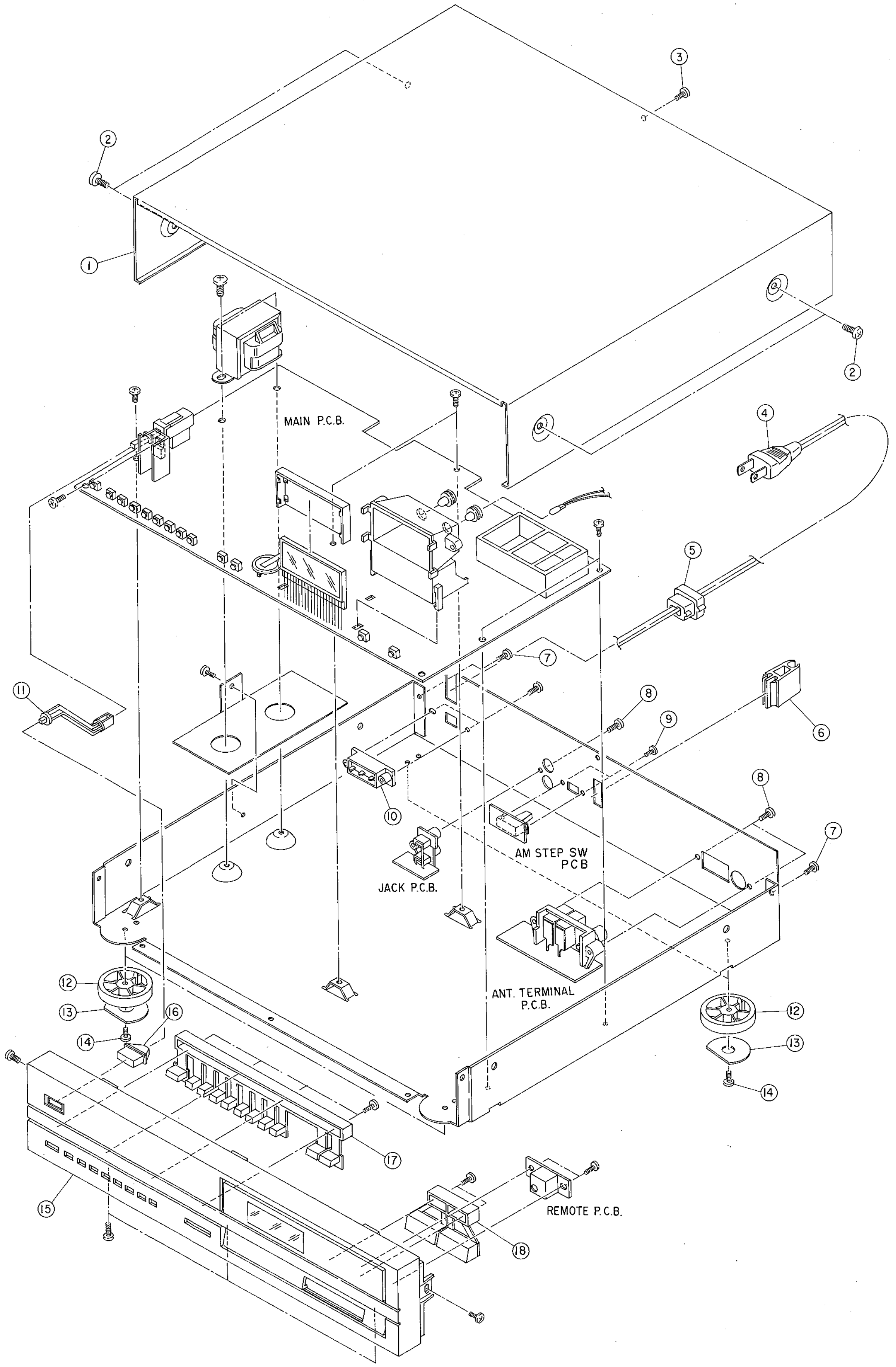
NOTE:

Parts will not be supplied if they are not listed in the parts list, even if they appear on the assembling illustrations with reference No.

10. ACCESSARY

Ref. No.	Part No.	Description
1	EW-336757	CORD SAE-020 PINX2
2	EE-359265	ANT LOOP LA-200A-A
3	EE-315329	ANT DIPOLE SAE-010
4	EJ-352118	SOCKET COAX PAL B2-714P-900

FINAL ASSEMBLY BLOCK



AKAI

MODEL AT-M459/L
MODEL AT-M659/L

SCHEMATIC DIAGRAM AND PC BOARDS

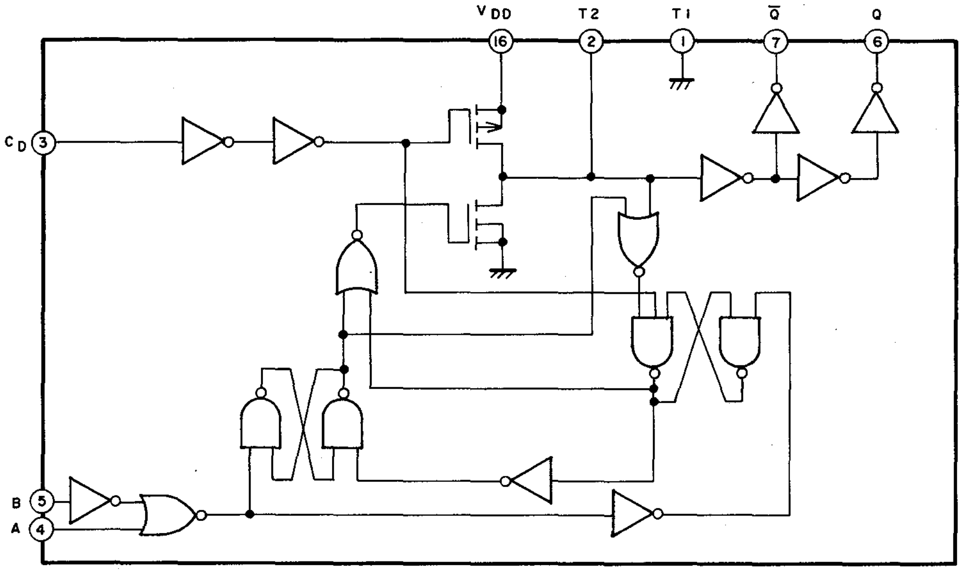
TABLE OF CONTENTS

1. IC's 2
2. BLOCK DIAGRAM 3
3. AT-M459/M659 MAIN PC BOARD AND OTHERS PC BOARD 4
4. AT-M459/M659 CONNECTION DIAGRAM 5
5. AT-M459L/M659L CONNECTION DIAGRAM 6
6. AT-M459L/M659L MAIN PC BOARD AND OTHERS PC BOARD.. 7

TC9306F-022

PIN. NO.	NAME	I/O	DESCRIPTION
1 to 17	S7 to S23	O	LCD Segment data Output
18 to 19	S24 to S27	O	Not used
22	COM1	O	Output of LCD Segment for <COM1>
23	VDD	—	Not used
24 to 27	K0 to K3	I	KEY Input
28 to 32	T0 to T4	O	KEY MATRIX STROB Output
33	T5	—	Not used
34	T6	O	Switch Matrix Output
35	<$\overline{\text{TUNED}}$>	I	Tuned Mode Input (When tuned mode: L)
36	<$\overline{\text{STEREO}}$>	I	Stereo Mode Input (When stereo mode: L)
37	<$\overline{\text{MUTE}}$>	O	MUTE Control (L: MUTE)
38	<$\overline{\text{REMOCON}}$>	I	REMOCON Control Input
39	<SW1>	O	Not used
40	<F/R>	O	Not used
41	$\overline{\text{MONO}}$	O	Forced MONO Control Output
42	STB	O	STROB Pulse Output
43	CK	O	Serial Clock Output
44	SO	O	Serial Data Output
45	SI	I	Not used
46	REF	I	REFERENCE Signal Output
47	$\overline{\text{INT}}$	I	
48	$\overline{\text{INH}}$	I	
49	TEST	—	Not used
50	XT		} Terminals for X'tal
51	$\overline{\text{XT}}$		
52	GND		GND
53	VDD		+5V
54	COM 2	O	Output of LCD Segment for <COM2>
55 to 60	S1 ~ S6	O	LCD Segment data Output

µPD4528 (Dual Monostable Multiribrator)

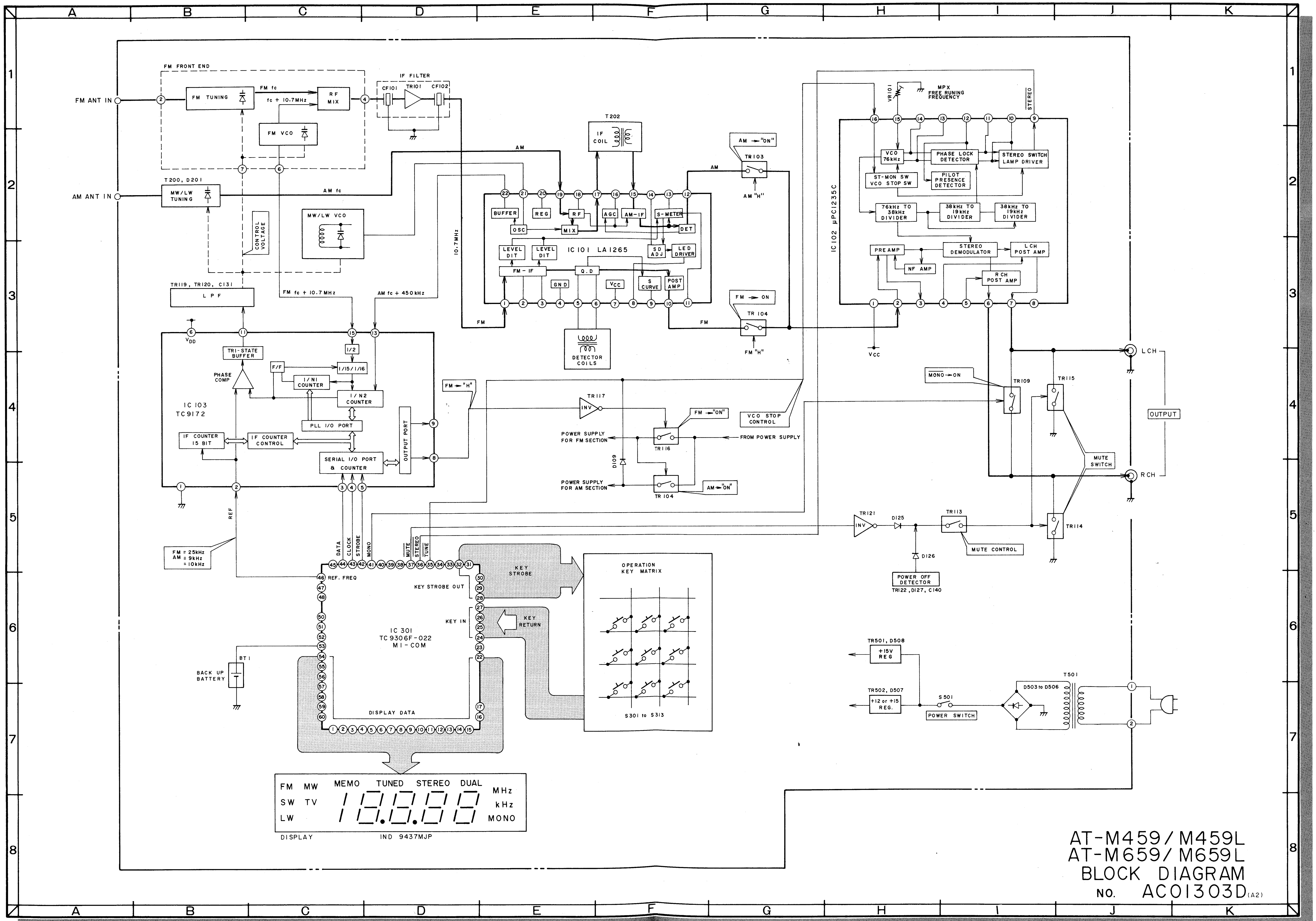


(1/2 DEVICE)

TRUTH TABLE

INPUT			OUTPUT	
A	B	C_D	Q	$\overline{Q}$
↑	H	H	⊓	⊔
↑	L	H	Q	$\overline{Q}$
H	↓	H	Q	$\overline{Q}$
L	↓	H	⊓	⊔
X	X	L	L	H

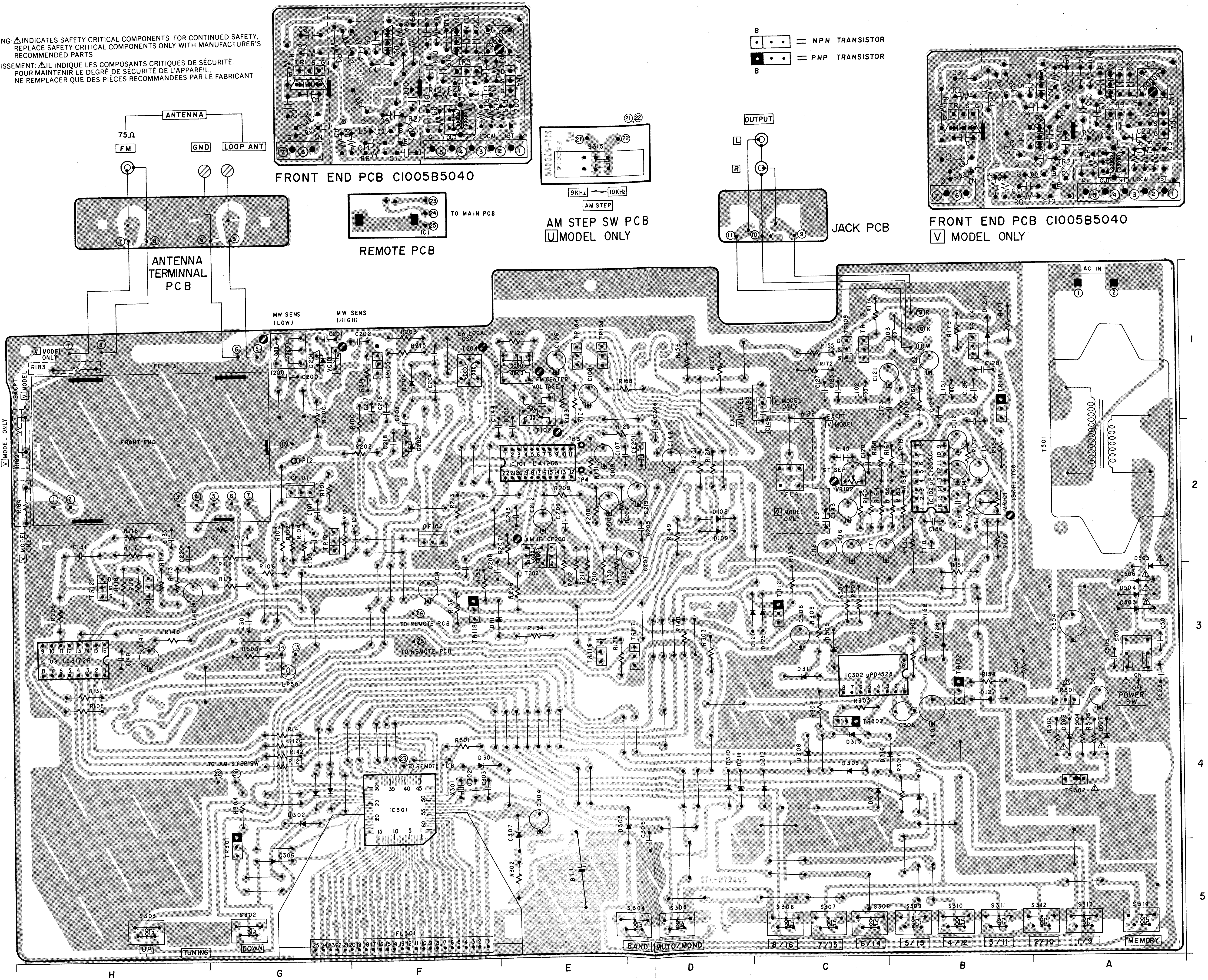
X : H or L


FM FRONT END
FM ANT IN
FM TUNING
FM fc
fc + 10.7MHz
RF MIX
FM VCO
IF FILTER
CF101
TR101
CF102
T202
IF COIL
AM
AM "ON"
TR103
AM "H"
T200, D201
AM ANT IN
MW/LW TUNING
AM fc
CONTROL VOLTAGE
MW/LW VCO
10.7MHz
BUFFER
REG
RF
MIX
OSC
AGC
AM-IF
S-METER
DET
LEVEL DIT
IC101 LA1265
SD ADJ
LED DRIVER
FM-IF
Q.D
S CURVE
POST AMP
GND
VCC
DETECTOR COILS
FM
FM → ON
TR104
FM "H"
TR119, TR120, C131
LPF
FM fc + 10.7MHz
AM fc + 450kHz
VDD
TRI-STATE BUFFER
1/2
F/F
1/15/1/16
PHASE COMP
1/N1 COUNTER
1/N2 COUNTER
IC103 TC9172
PLL I/O PORT
IF COUNTER 15 BIT
IF COUNTER CONTROL
SERIAL I/O PORT & COUNTER
OUTPUT PORT
REF
FM = 25kHz
AM = 9kHz = 10kHz
FM → "H"
TR117
INV
FM → "ON"
POWER SUPPLY FOR FM SECTION
TR116
FROM POWER SUPPLY
D109
POWER SUPPLY FOR AM SECTION
TR104
AM → "ON"
VCO STOP CONTROL
VR101
MPX FREE RUNING FREQUENCY
STEREO
VCO 76kHz
PHASE LOCK DETECTOR
STEREO SWITCH LAMP DRIVER
ST-MON SW VCO STOP SW
PILOT PRESENCE DETECTOR
IC102 μPC1235C
76kHz TO 38kHz DIVIDER
38kHz TO 19kHz DIVIDER
38kHz TO 19kHz DIVIDER
PREAMP
STEREO DEMODULATOR
LCH POST AMP
NF AMP
RCH POST AMP
VCC
LCH
MONO → ON
TR109
TR115
OUTPUT
MUTE SWITCH
RCH
TR121
INV
D125
TR113
TR114
MUTE CONTROL
D126
POWER OFF DETECTOR
TR122, D127, C140
DATA
CLOCK
STROBE
MONO
MUTE
STEREO
TUNE
REF. FREQ
KEY STROBE
KEY STROBE OUT
OPERATION KEY MATRIX
KEY IN
KEY RETURN
IC301 TC9306F-022 MI-COM
BT1
BACK UP BATTERY
DISPLAY DATA
S301 to S313
TR501, D508
+15V REG
TR502, D507
+12 or +15 REG.
S501
POWER SWITCH
D503 to D506
T501
FM MW
MEMO TUNED STEREO DUAL
SW TV
LW
MHz
kHz
MONO
DISPLAY
IND 9437MJP
A B C D E F G H I J K
1 2 3 4 5 6 7 8

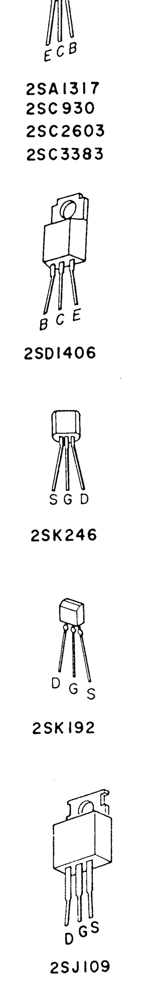
AT-M459/M459L
AT-M659/M659L
BLOCK DIAGRAM
NO. AC01303D(A2)

WARNING: ⚠ INDICATES SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSEMENT: ⚠ IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ. POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDEES PAR LE FABRICANT


FRONT END PCB C1005B5040
REMOTE PCB
TO MAIN PCB
AM STEP SW PCB
U MODEL ONLY
9KHz
10KHz
AM STEP
B
= NPN TRANSISTOR
= PNP TRANSISTOR
OUTPUT
L
R
JACK PCB
FRONT END PCB C1005B5040
V MODEL ONLY
ANTENNA
75Ω
FM
GND
LOOP ANT
ANTENNA TERMINNAL PCB
AC IN
MW SENS (LOW)
MW SENS (HIGH)
LW LOCAL OSC
FM CENTER VOL TAGE
FRONT END
FE-31
IC101 LA1265
IC102 μPC1235C
IC103 TC9172P
IC302 μPD4528
IC301
TO REMOTE PCB
TO AM STEP SW
ST SEP
19KHz VCO
AM IF
POWER SW
ON
OFF
S303 UP
TUNING
S302 DOWN
FL301
S304 BAND
S305 MUTO/MONO
S306 8/16
S307 7/15
S308 6/14
S309 5/15
S310 4/12
S311 3/11
S312 2/10
S313 1/9
S314 MEMORY
SFL-0794V0
H
G
F
E
D
C
B
A
1
2
3
4
5

MAIN PCB


E C B
2SA1317
2SC930
2SC2603
2SC3383
B C E
2SD1406
S G D
2SK246
D G S
2SK192
D G S
2SJ109

LOCATION OF COMPONENTS

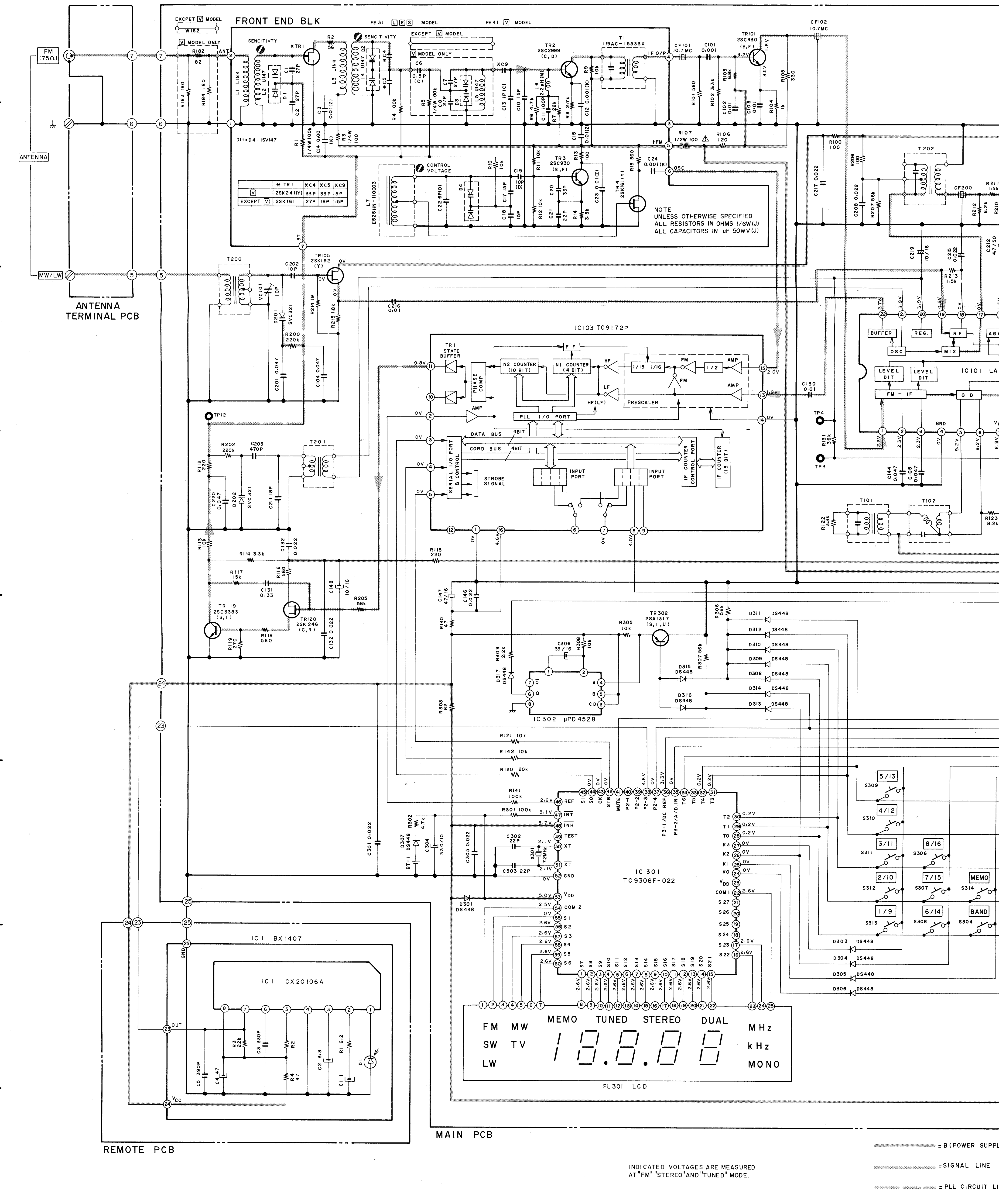
TRANSISTORS

TR101	G2
TR103	E1
TR104	E1
TR105	F1
TR109	C1
TR113	B1
TR115	B, C1
TR116	E3
TR117	D3
TR118	F3
TR119	H3
TR120	H3
TR121	C3
TR122	B3, 4
TR301	G4, 5
TR302	C4
TR501	A3, 4
TR502	A4

IC'S

IC1	E2
IC101	B2
IC301	F4
IC302	B, C3

AT-M459 / M659



A
B
C
D
E
F
1
2
3
4
5
6
7
8
FRONT END BLK
FE31 U E S MODEL
FE41 V MODEL
EXCPET V MODEL
V MODEL ONLY
FM (75Ω)
ANTENNA
MW/LW
ANTENNA TERMINAL PCB
T200
VC101
D201 SVC321
TR105 2SK192 (Y)
IC103 TC9172P
PRESCALER
PLL I/O PORT
DATA BUS
CORD BUS
INPUT PORT
IF COUNTER CONTROL PORT
IF COUNTER (15 BIT)
STROBE SIGNAL
N2 COUNTER (10 BIT)
N1 COUNTER (4 BIT)
TR1 STATE BUFFER
PHASE COMP
TR2 2SC2999 (C, D)
TR3 2SC930 (E, F)
TR4 2SK161 (Y)
T1 119AC-15533X
L7 E525HN-110003
CONTROL VOLTAGE
D1 to D4 : 1SV147
CF101 10.7MC
CF102 10.7MC
TR101 2SC930 (E, F)
T202
CF200
IC101 LA
BUFFER
REG.
OSC
RF
MIX
LEVEL DIT
FM - IF
Q D
T101
T102
TP3
TP4
TP12
T201
TR119 2SC3383 (S, T)
TR120 2SK246 (G, R)
TR302 2SA1317 (S, T, U)
IC302 μPD4528
IC301 TC9306F-022
X301 7.2MHz
BT-1
D301 DS448
IC1 BX1407
IC1 CX20106A
REMOTE PCB
MAIN PCB
FL301 LCD
FM
MW
SW
TV
LW
MEMO
TUNED
STEREO
DUAL
MHz
kHz
MONO
S309 5/13
S310 4/12
S311 3/11
S312 2/10
S313 1/9
S306 8/16
S307 7/15
S308 6/14
S314 MEMO
S304 BAND

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/6W(J)
ALL CAPACITORS IN μF 50WV(J)

	* TR1	*C4	*C5	*C9
V	2SK241(Y)	33P	33P	5P
EXCEPT V	2SK161	27P	18P	15P

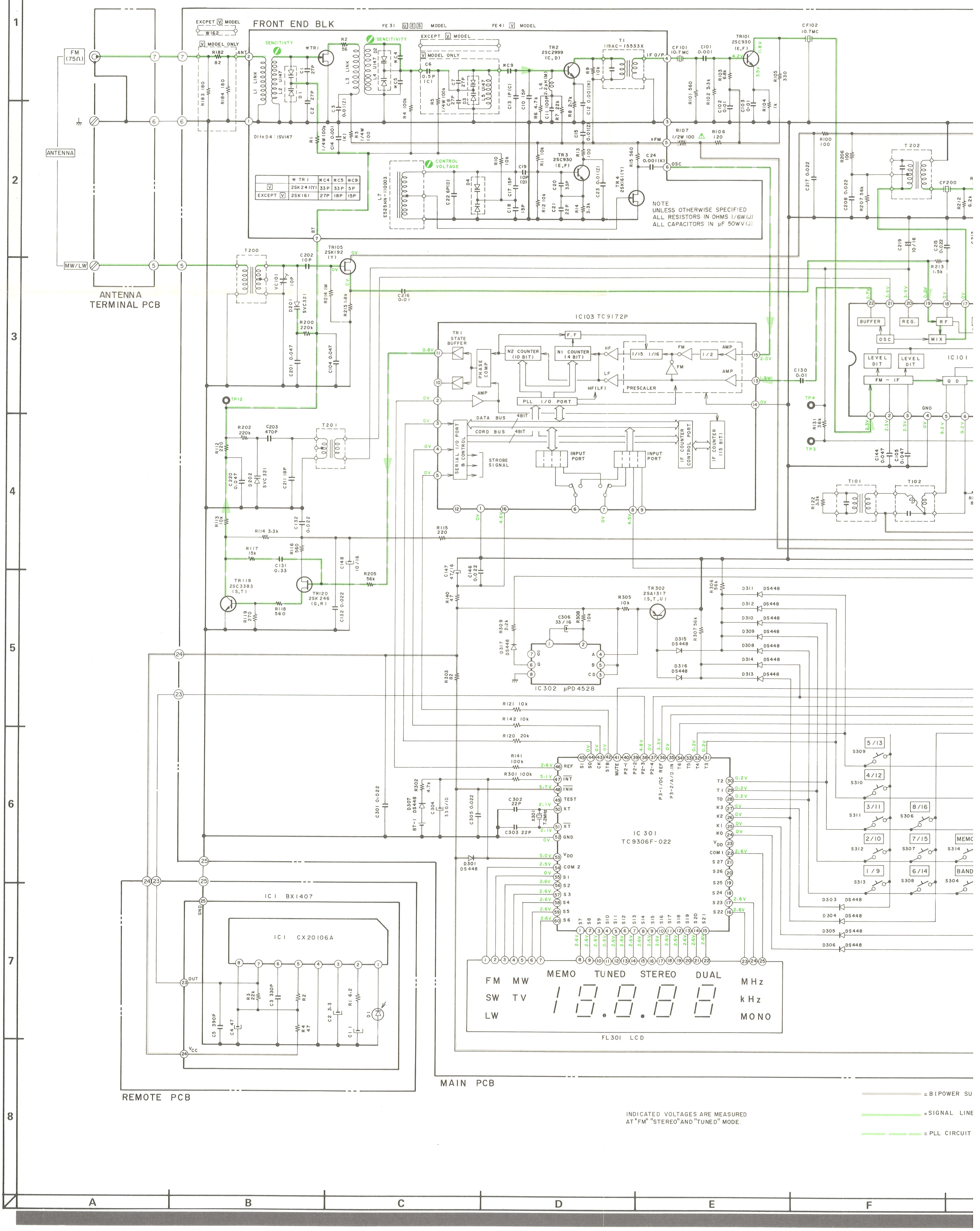
INDICATED VOLTAGES ARE MEASURED
AT "FM" "STEREO" AND "TUNED" MODE.

= B (POWER SUPPL

= SIGNAL LINE

= PLL CIRCUIT LI

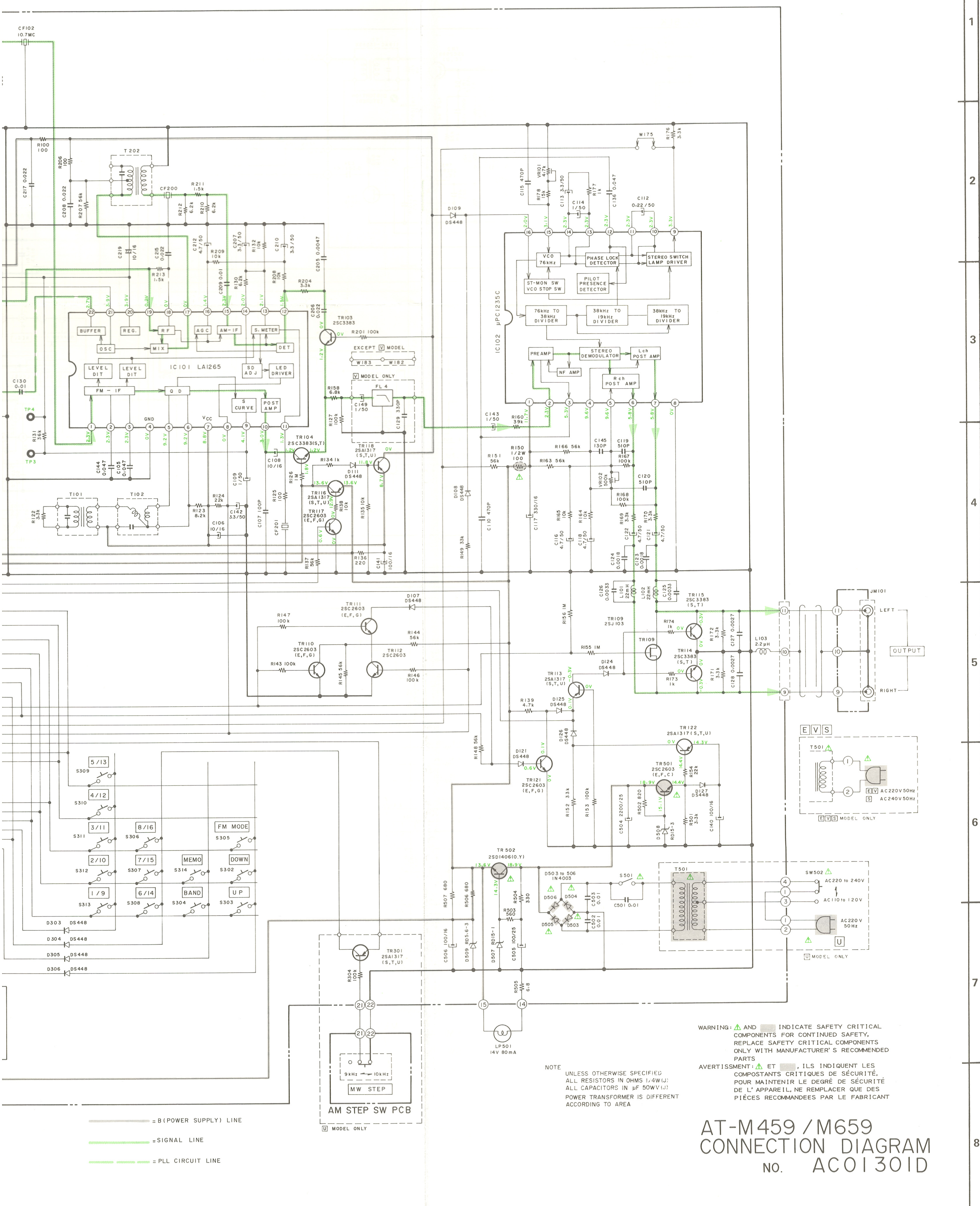
AT-M459 / M659


FRONT END BLK
FE31 U E S MODEL
FE41 V MODEL
EXCPET V MODEL
W162
V MODEL ONLY
FM (75Ω)
ANTENNA
MW/LW
ANTENNA TERMINAL PCB
R182 82
R183 180
R184 180
L1 LINK
L2 U147
D1
C1 27P
C2 27P
SENCITIVTY
*TR1
R2 56
L3 LINK
C3 0.01(Z)
R1 1/4W 100k
C14 0.001 (K)
R3 1/4W 100
SENCITIVITY
L4 U147 D2
*C4
*C5
EXCEPT V MODEL
V MODEL ONLY
C6 0.5P (C)
R5 1/4W 100k
C8 27P
C7 27P
D3
L5 U147
R4 100k
*C9
C13 1P(C)
C10 15P
L6 2.2μH(M)
R6 4.7k
C11 100P
R7 22k
TR2 2SC2999 (C,D)
R9 10k
R8 2.7k
C12 0.001(K)
C15 0.01(Z)
T1 119AC-15533X
IF O/P
CF101 10.7MC
C101 0.001
R101 560
R102 3.3k
C102 0.01
R103 6.8k
TR101 2SC930 (E,F)
C103 0.01
R104 1k
R105 330
CF102 10.7MC
R107 1/2W 100
R106 120
+FM
D1 to D4 : 1SV147
CONTROL VOLTAGE
L7 E525HN-110003
C22 6P(D)
D4
R10 10k
C19 10P (D)
C17 15P
C18 15P
R11 10k
R12 10k
TR3 2SC930 (E,F)
R13 100
C20 33P
C21 22P
R14 3.3k
C23 0.01(Z)
R15 560
TR4 2SK161(Y)
C24 0.001(K)
OSC
BT
*TR1 | *C4 | *C5 | *C9
V | 2SK241(Y) | 33P | 33P | 5P
EXCEPT V | 2SK161 | 27P | 18P | 15P
T200
C202 10P
TR105 2SK192 (Y)
VC101 10P
D201 SVC321
R214 1M
R215 1.8k
R200 220k
C201 0.047
C104 0.047
C216 0.01
IC103 TC9172P
TR1 STATE BUFFER
PHASE COMP
N2 COUNTER (10 BIT)
N1 COUNTER (4 BIT)
F.F
HF
LF
1/15 1/16
FM
1/2
AMP
PRESCALER
HF(LF)
PLL I/O PORT
DATA BUS
CORD BUS
4BIT
SERIAL I/O PORT & CONTROL
STROBE SIGNAL
INPUT PORT
IF COUNTER CONTROL PORT
IF COUNTER (15 BIT)
TP12
R202 220k
C203 470P
T201
R112 220
C220 0.047
D202 SVC321
C211 18P
R113 10k
R114 3.3k
C132 0.022
R115 220
R117 15k
R116 560
C131 0.33
C148 10/16
R205 56k
TR119 2SC3383 (S,T)
TR120 2SK246 (G,R)
R119 270
R118 560
C132 0.022
C147 47/16
C146 0.022
R140 47
R339 2.2k
D317 DS448
C306 33/16
R308 10k
R305 10k
TR302 2SA1317 (S,T,U)
R306 56k
R307 56k
D315 DS448
D316 DS448
IC302 μPD4528
R303 82
D311 DS448
D312 DS448
D310 DS448
D309 DS448
D308 DS448
D314 DS448
D313 DS448
R121 10k
R142 10k
R120 20k
R141 100k
R301 100k
REF
INT
INH
TEST
XT
GND
VDD
COM 2
S1 S2 S3 S4 S5 S6
SI SO CK STB MUTE P2-1 P2-2 P2-3 P2-4 REF P3-1/DC P3-2/A/D IN T6 T5 T4 T3
T2 T1 T0 K3 K2 K1 K0 VDD COM1 S27 S26 S25 S24 S23 S22
S7 S8 S9 S10 S11 S12 S13 S14 S15 S16 S17 S18 S19 S20 S21
IC301 TC9306F-022
C301 0.022
D307 DS448
R302 4.7k
C304 330/10
BT-1
C305 0.022
C302 22P
X301 7.2MHz
C303 22P
D301 DS448
5/13 S309
4/12 S310
3/11 S311
2/10 S312
1/9 S313
8/16 S306
7/15 S307
6/14 S308
MEMO S314
BAND S304
D303 DS448
D304 DS448
D305 DS448
D306 DS448
FM MW SW TV LW MEMO TUNED STEREO DUAL MHz kHz MONO
FL301 LCD
IC1 BX1407
IC1 CX20106A
OUT
VCC
GND
R3 22k
C3 330P
R2
C2 3.3
R1 6.2
D1
C5 390P
C4 47
R4 47
C1 1
REMOTE PCB
MAIN PCB
T202
R100 100
R206 100
C217 0.022
C208 0.022
R207 56k
CF200
R212
C219 10/16
C215 0.022
R213 1.5k
BUFFER
REG.
RF
OSC
MIX
LEVEL DIT
IC101
FM-IF
QD
GND
TP4
TP3
R131 36k
C130 0.01
C144 0.047
C105 0.047
T101
T102
R122 3.3k

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/6W(J)
ALL CAPACITORS IN μF 50WV(J)

INDICATED VOLTAGES ARE MEASURED
AT "FM" "STEREO" AND "TUNED" MODE.

= B (POWER SU
= SIGNAL LINE
= PLL CIRCUIT

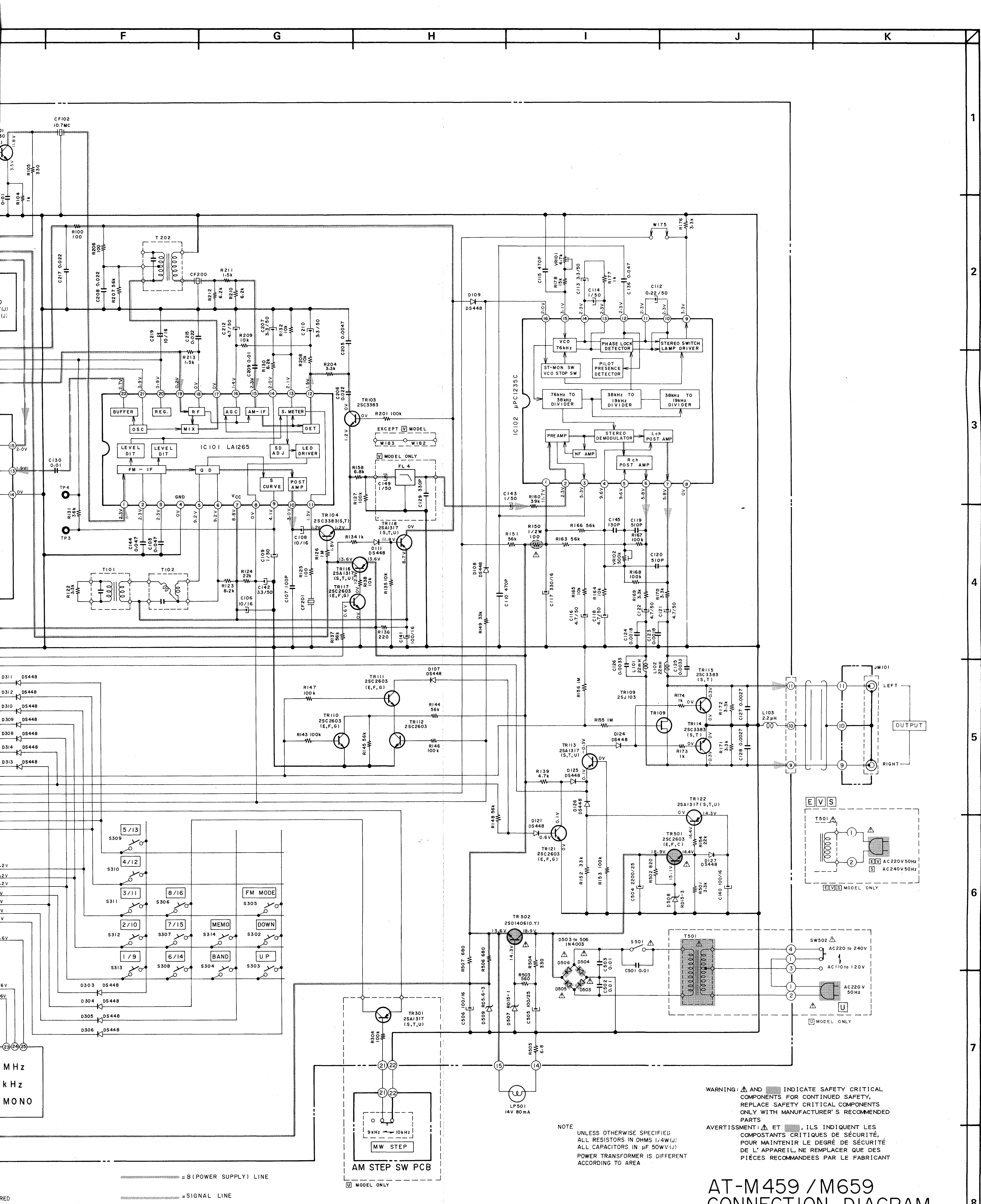

F
G
H
I
J
K
1
2
3
4
5
6
7
8
CF102 10.7MC
R100 100
T202
CF200
IC101 LA1265
BUFFER
REG.
OSC
MIX
RF
AGC
AM-IF
S.METER
DET
LEVEL DIT
LEVEL DIT
FM-IF
QD
S CURVE
POST AMP
SD ADJ
LED DRIVER
GND
VCC
TP4
TP3
T101
T102
TR103 2SC3383
TR104 2SC3383(S,T)
TR116 2SA1317 (S,T,U)
TR117 2SC2603 (E,F,G)
TR118 2SA1317 (S,T,U)
EXCEPT V MODEL
V MODEL ONLY
W183
W182
FL 4
IC102 μPC1235C
VCO 76kHz
PHASE LOCK DETECTOR
STEREO SWITCH LAMP DRIVER
ST-MON SW VCO STOP SW
PILOT PRESENCE DETECTOR
76kHz TO 38kHz DIVIDER
38kHz TO 19kHz DIVIDER
38kHz TO 19kHz DIVIDER
PREAMP
STEREO DEMODULATOR
Lch POST AMP
NF AMP
Rch POST AMP
W175
D109 DS448
TR109 2SJ103
TR114 2SC3383 (S,T)
TR115 2SC3383 (S,T)
L103 2.2μH
JM101
LEFT
RIGHT
OUTPUT
TR110 2SC2603 (E,F,G)
TR111 2SC2603 (E,F,G)
TR112 2SC2603
D107 DS448
TR113 2SA1317 (S,T,U)
TR121 2SC2603 (E,F,G)
TR122 2SA1317 (S,T,U)
TR501 2SC2603 (E,F,C)
TR502 2SD1406(O,Y)
D503 to 506 IN4003
S501
C501 0.01
T501
SW502
AC220 to 240V
AC110 to 120V
AC220V 50Hz
U
U MODEL ONLY
E V S
E V AC220V 50Hz
S AC240V 50Hz
E V S MODEL ONLY
LP501 14V 80mA
5/13
S309
4/12
S310
3/11
S311
8/16
S306
FM MODE
S305
2/10
S312
7/15
S307
MEMO
S314
DOWN
S302
1/9
S313
6/14
S308
BAND
S304
UP
S303
D303 DS448
D304 DS448
D305 DS448
D306 DS448
TR301 2SA1317 (S,T,U)
R304 100k
9kHz 10kHz
MW STEP
AM STEP SW PCB
U MODEL ONLY
= B (POWER SUPPLY) LINE
= SIGNAL LINE
= PLL CIRCUIT LINE

NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(J)
POWER TRANSFORMER IS DIFFERENT
ACCORDING TO AREA

WARNING: ⚠ AND ▨ INDICATE SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSMENT: ⚠ ET ▨, ILS INDIQUENT LES COMPOSTANTS CRITIQUES DE SÉCURITÉ, POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDEES PAR LE FABRICANT

AT-M459 / M659
CONNECTION DIAGRAM
NO. AC01301D


F
G
H
I
J
K
1
2
3
4
5
6
7
8
CF102 10.7MC
T202
CF200
IC101 LA1265
BUFFER
REG.
RF
AGC
AM-IF
S. METER
OSC
MIX
DET
LEVEL DIT
SD ADJ
LED DRIVER
FM - IF
Q D
S CURVE
POST AMP
GND
VCC
TP4
TP3
T101
T102
TR103 2SC3383
TR104 2SC3383(S,T)
TR116 2SA1317 (S,T,U)
TR117 2SC2603 (E,F,G)
TR118 2SA1317 (S,T,U)
EXCEPT V MODEL
W183
W182
V MODEL ONLY
FL 4
IC102 μPC1235C
VCO 76kHz
PHASE LOCK DETECTOR
STEREO SWITCH LAMP DRIVER
ST-MON SW VCO STOP SW
PILOT PRESENCE DETECTOR
76kHz TO 38kHz DIVIDER
38kHz TO 19kHz DIVIDER
38kHz TO 19kHz DIVIDER
PREAMP
STEREO DEMODULATOR
Lch POST AMP
NF AMP
Rch POST AMP
W175
TR111 2SC2603 (E,F,G)
TR110 2SC2603 (E,F,G)
TR112 2SC2603
TR109 2SJ103
TR115 2SC3383
TR114 2SC3383 (S,T)
TR113 2SA1317 (S,T,U)
TR121 2SC2603 (E,F,G)
TR122 2SA1317 (S,T,U)
TR501 2SC2603 (E,F,C)
TR502 2SD1406(O,Y)
JM101
LEFT
RIGHT
OUTPUT
L103 2.2μH
E V S
T501
E V AC220V 50Hz
S AC240V 50Hz
E V S MODEL ONLY
D503 to 506 1N4003
S501
C501 0.01
SW502
AC220 to 240V
AC110 to 120V
AC220V 50Hz
U
U MODEL ONLY
5/13
4/12
3/11
8/16
FM MODE
2/10
7/15
MEMO
DOWN
1/9
6/14
BAND
UP
TR301 2SA1317 (S,T,U)
LP501 14V 80mA
9kHz 10kHz
MW STEP
AM STEP SW PCB
U MODEL ONLY
MHz
kHz
MONO

= B(POWER SUPPLY) LINE

= SIGNAL LINE

= PLL CIRCUIT LINE

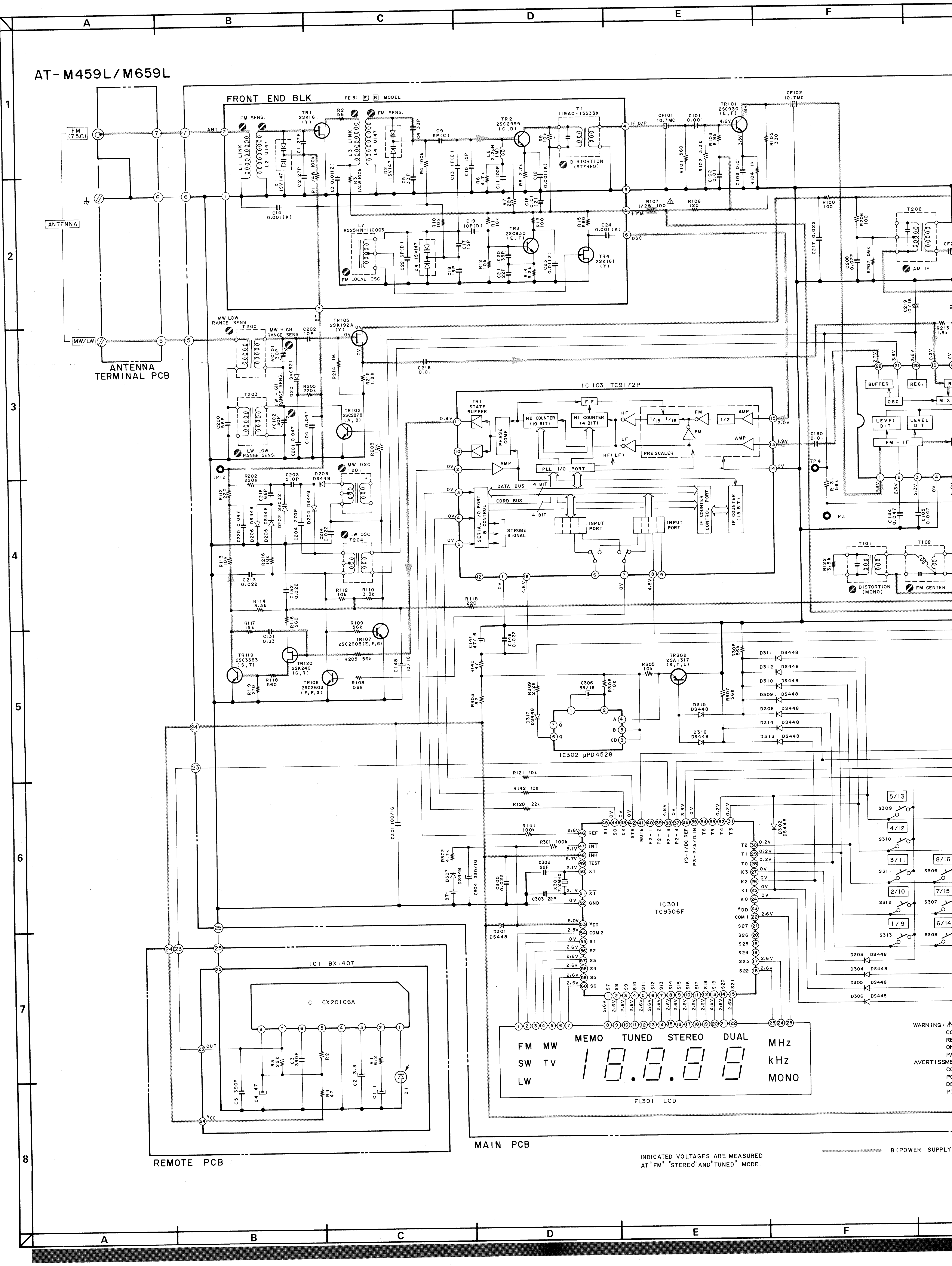
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/4W(J)
ALL CAPACITORS IN μF 50WV(J)
POWER TRANSFORMER IS DIFFERENT
ACCORDING TO AREA

WARNING: ⚠ AND ▨ INDICATE SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSMENT: ⚠ ET ▨, ILS INDIQUENT LES COMPOSTANTS CRITIQUES DE SÉCURITÉ, POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L' APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDEES PAR LE FABRICANT

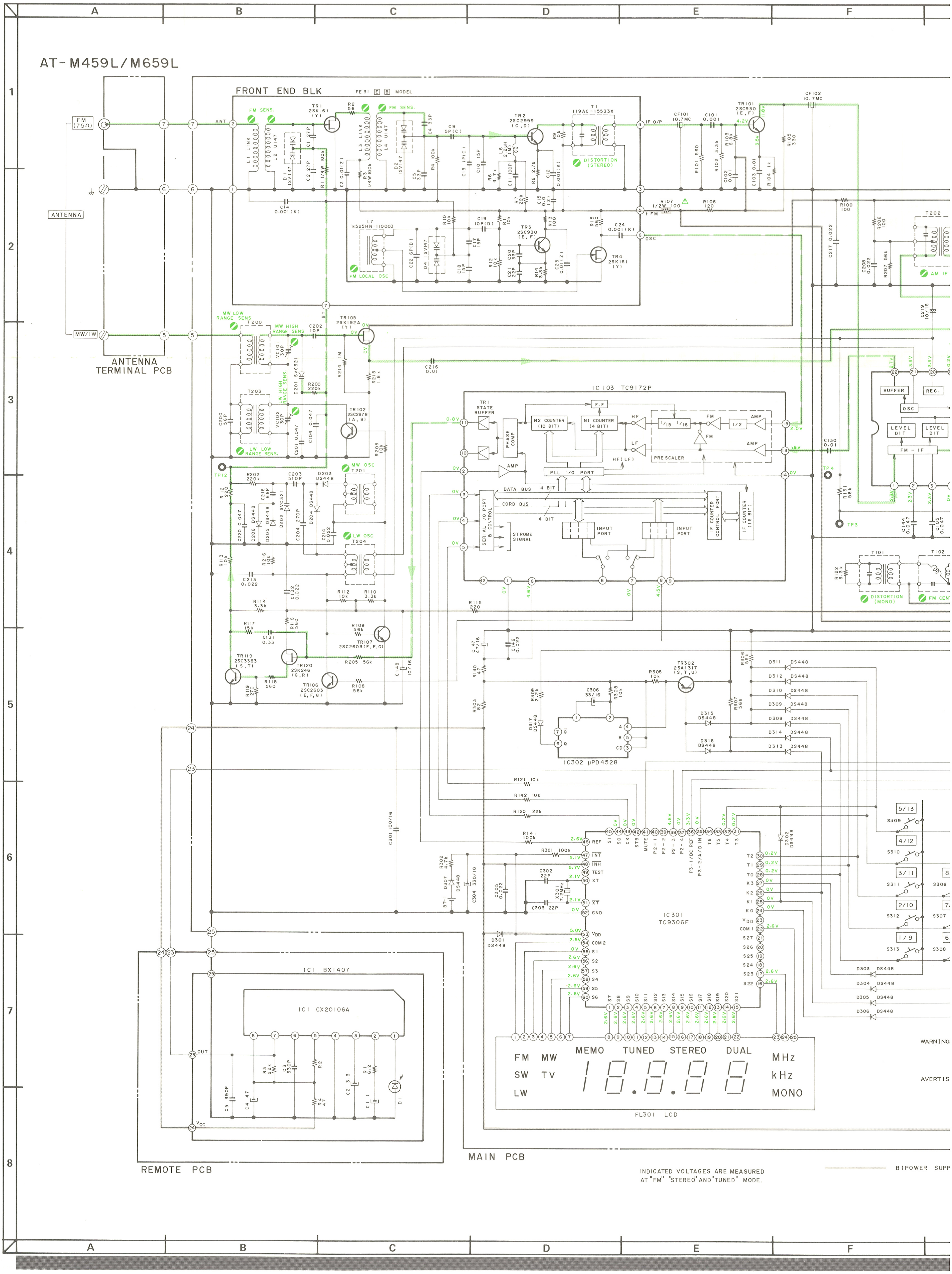
AT-M459 / M659
CONNECTION DIAGRAM
NO. AC01301D

AT-M459L/M659L


FRONT END BLK
FE 31 E B MODEL
FM (75Ω)
ANTENNA
MW/LW
ANTENNA TERMINAL PCB
FM SENS.
TR1 2SK161 (Y)
TR2 2SC2999 (C,D)
T1 119AC-15533X
DISTORTION (STEREO)
IF O/P
CF101 10.7MC
CF102 10.7MC
TR101 2SC930 (E,F)
L7 E525HN-110003
FM LOCAL OSC
TR3 2SC930 (E,F)
TR4 2SK161 (Y)
OSC
+FM
R107 1/2W 100
T202
AM IF
MW LOW RANGE SENS
T200
MW HIGH RANGE SENS
TR105 2SK192A (Y)
T203
LW HIGH RANGE SENS.
LW LOW RANGE SENS.
TR102 2SC2878 (A,B)
TP12
MW OSC T201
LW OSC T204
IC103 TC9172P
STATE BUFFER
PHASE COMP
N2 COUNTER (10 BIT)
N1 COUNTER (4 BIT)
F.F
PRE SCALER
PLL I/O PORT
DATA BUS
CORD BUS
SERIAL I/O PORT & CONTROL
STROBE SIGNAL
INPUT PORT
IF COUNTER CONTROL PORT
IF COUNTER (15 BIT)
TP4
TP3
BUFFER
REG.
OSC
MIX
LEVEL DIT
FM - IF
T101
T102
DISTORTION (MONO)
FM CENTER
TR107 2SC2603(E,F,G)
TR119 2SC3383 (S,T)
TR120 2SK246 (G,R)
TR106 2SC2603 (E,F,G)
TR302 2SA1317 (S,T,U)
IC302 μPD4528
IC301 TC9306F
X301 7.2MHz
S309 5/13
S310 4/12
S311 3/11
S312 2/10
S313 1/9
S306 8/16
S307 7/15
S308 6/14
FL301 LCD
FM MW SW TV LW
MEMO TUNED STEREO DUAL
18.8.88
MHz kHz MONO
IC1 BX1407
IC1 CX20106A
REMOTE PCB
MAIN PCB
B(POWER SUPPLY
WARNING
AVERTISSEMENT

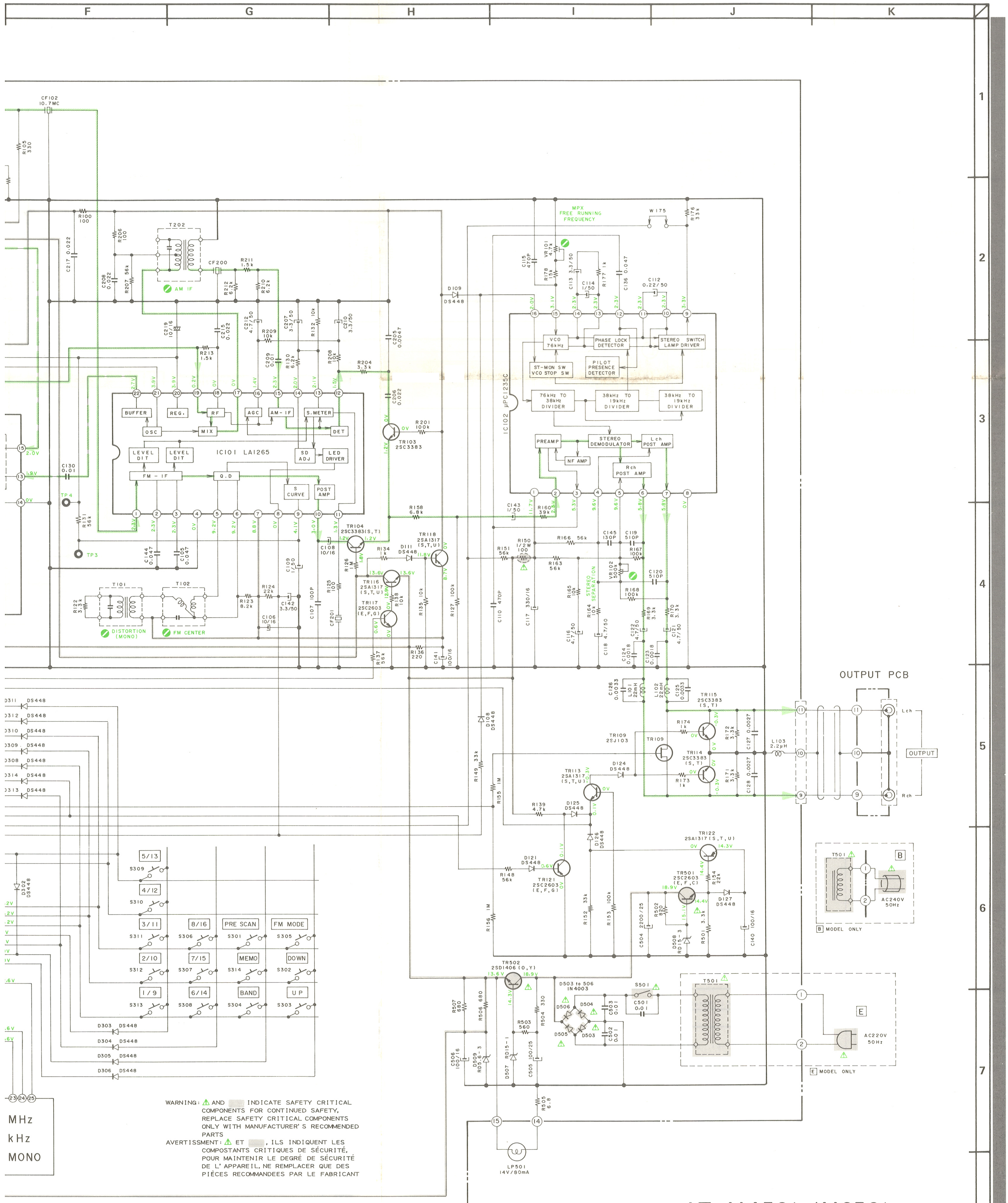
INDICATED VOLTAGES ARE MEASURED AT "FM" "STEREO" AND "TUNED" MODE.

AT-M459L/M659L


A
B
C
D
E
F
1
2
3
4
5
6
7
8
FRONT END BLK
FE31 E B MODEL
FM (75Ω)
ANTENNA
MW/LW
ANTENNA TERMINAL PCB
ANT
FM SENS.
TR1 2SK161 (Y)
TR2 2SC2999 (C,D)
T1 119AC-15533X
DISTORTION (STEREO)
IF O/P
CF101 10.7MC
C101 0.001
TR101 2SC930 (E,F)
CF102 10.7MC
L7 E525HN-110003
FM LOCAL OSC
TR3 2SC930 (E,F)
TR4 2SK161 (Y)
+FM
OSC
BT
MW LOW RANGE SENS.
T200
MW HIGH RANGE SENS.
TR105 2SK192A (Y)
T203
LW HIGH RANGE SENS.
LW LOW RANGE SENS.
TR102 2SC2878 (A,B)
TP12
MW OSC T201
LW OSC T204
TR107 2SC2603 (E,F,G)
TR119 2SC3383 (S,T)
TR120 2SK246 (G,R)
TR106 2SC2603 (E,F,G)
IC103 TC9172P
TRI STATE BUFFER
PHASE COMP
N2 COUNTER (10 BIT)
N1 COUNTER (4 BIT)
F.F
HF
LF
FM
AMP
PRESCALER
HF(LF)
PLL I/O PORT
DATA BUS
CORD BUS
4 BIT
SERIAL I/O PORT & CONTROL
STROBE SIGNAL
INPUT PORT
IF COUNTER CONTROL PORT
IF COUNTER (15 BIT)
TP4
TP3
T202
AM IF
BUFFER
REG.
OSC
LEVEL DIT
FM-IF
T101
T102
DISTORTION (MONO)
FM CEN
TR302 2SA1317 (S,T,U)
IC302 μPD4528
IC301 TC9306F
REF
INT
INH
TEST
XT
GND
VDD
COM 2
COM 1
X301 7.2MHz
5/13
4/12
3/11
2/10
1/9
S309
S310
S311
S312
S313
S306
S307
S308
IC1 BX1407
IC1 CX20106A
OUT
VCC
REMOTE PCB
MAIN PCB
MEMO
TUNED
STEREO
DUAL
FM
MW
SW
TV
LW
MHz
kHz
MONO
FL301 LCD
WARNING
AVERTIS

INDICATED VOLTAGES ARE MEASURED AT "FM" "STEREO" AND "TUNED" MODE.

B (POWER SUPP


F
G
H
I
J
K
1
2
3
4
5
6
7
8
CF102 10.7MC
R105 330
R100 100
R206 100
T202
AM IF
CF200
R211 1.5k
IC101 LA1265
BUFFER
REG.
RF
AGC
AM-IF
S.METER
OSC
MIX
DET
LEVEL DIT
LEVEL DIT
SD ADJ
LED DRIVER
FM-IF
Q.D
S CURVE
POST AMP
TP4
TP3
T101
T102
DISTORTION (MONO)
FM CENTER
TR103 2SC3383
TR104 2SC3383(S,T)
TR118 2SA1317 (S,T,U)
TR116 2SA1317 (S,T,U)
TR117 2SC2603 (E,F,G)
D109 DS448
D111 DS448
MPX FREE RUNNING FREQUENCY
W175
VR101 4.7k
IC102 μPC1235C
VCO 76kHz
PHASE LOCK DETECTOR
STEREO SWITCH LAMP DRIVER
ST-MON SW VCO STOP SW
PILOT PRESENCE DETECTOR
76kHz TO 38kHz DIVIDER
38kHz TO 19kHz DIVIDER
38kHz TO 19kHz DIVIDER
PREAMP
STEREO DEMODULATOR
Lch POST AMP
NF AMP
Rch POST AMP
VR102 500k
STEREO SEPARATION
OUTPUT PCB
Lch
Rch
OUTPUT
L103 2.2μH
TR109 2SJ103
TR115 2SC3383 (S,T)
TR114 2SC3383 (S,T)
TR113 2SA1317 (S,T,U)
TR121 2SC2603 (E,F,G)
TR122 2SA1317(S,T,U)
TR501 2SC2603 (E,F,G)
TR502 2SD1406 (O,Y)
D124 DS448
D125 DS448
D126 DS448
D127 DS448
D121 DS448
D108 DS448
T501
B
AC240V 50Hz
B MODEL ONLY
E
AC220V 50Hz
E MODEL ONLY
S501
D503 to 506 IN4003
LP501 14V/80mA
5/13
4/12
3/11
2/10
1/9
8/16
7/15
6/14
PRE SCAN
MEMO
BAND
FM MODE
DOWN
UP
S309
S310
S311
S312
S313
S306
S307
S308
S301
S314
S304
S305
S302
S303
D303 DS448
D304 DS448
D305 DS448
D306 DS448
D302 DS448
MHz
kHz
MONO

WARNING: ⚠ AND ▨ INDICATE SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY, REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSMENT: ⚠ ET ▨, ILS INDIQUENT LES COMPOSTANTS CRITIQUES DE SÉCURITÉ, POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDEES PAR LE FABRICANT

NOTE

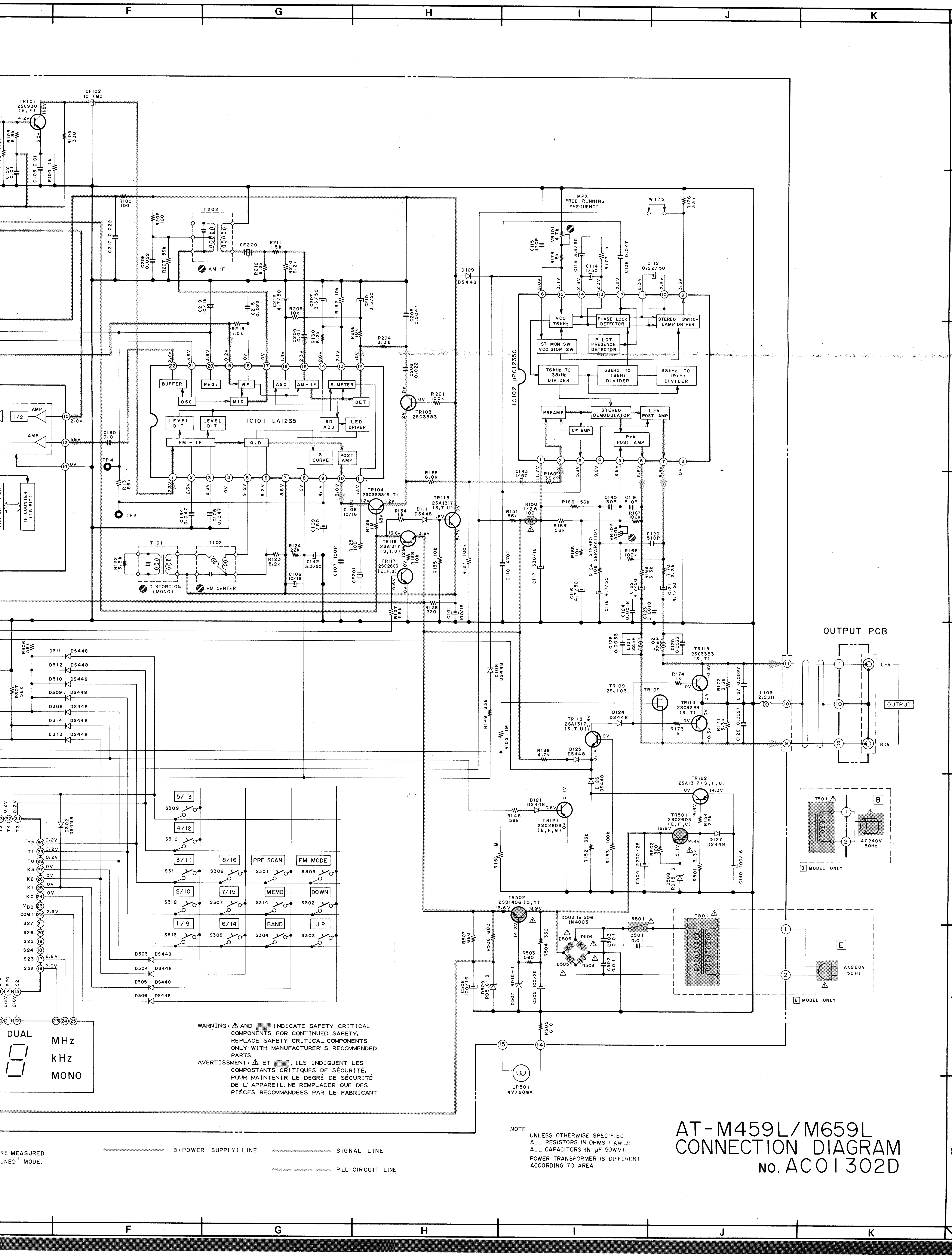
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/6W(J)
ALL CAPACITORS IN μF 50WV(J)
POWER TRANSFORMER IS DIFFERENT
ACCORDING TO AREA

B(POWER SUPPLY) LINE

SIGNAL LINE

PLL CIRCUIT LINE

AT-M459L/M659L
CONNECTION DIAGRAM
NO. AC01302D


F
G
H
I
J
K
TR101 2SC930 (E, F)
CF102 10.7MC
R105 330
R100 100
T202
AM IF
CF200
R211 1.5k
IC101 LA1265
BUFFER
REG.
RF
AGC
AM - IF
S.METER
OSC
MIX
DET
LEVEL DIT
SD ADJ
LED DRIVER
FM - IF
Q.D
S CURVE
POST AMP
TR103 2SC3383
TR104 2SC3383(S,T)
TR116 2SA1317 (S,T,U)
TR117 2SC2603 (E,F,G)
TR118 2SA1317 (S,T,U)
T101
T102
DISTORTION (MONO)
FM CENTER
TP3
TP4
1/2
AMP
IF COUNTER (15 BIT)
MPX FREE RUNNING FREQUENCY
W175
VR101 4.7k
IC102 μPC1235C
VCO 76kHz
PHASE LOCK DETECTOR
STEREO SWITCH LAMP DRIVER
ST-MON SW VCO STOP SW
PILOT PRESENCE DETECTOR
76kHz TO 38kHz DIVIDER
38kHz TO 19kHz DIVIDER
38kHz TO 19kHz DIVIDER
PREAMP
STEREO DEMODULATOR
Lch POST AMP
NF AMP
Rch POST AMP
VR102 STEREO SEPARATION
OUTPUT PCB
TR115 2SC3383 (S,T)
TR109 2SJ103
TR114 2SC3383 (S,T)
L103 2.2μH
Lch
OUTPUT
Rch
TR113 2SA1317 (S,T,U)
TR121 2SC2603 (E,F,G)
TR122 2SA1317(S,T,U)
TR501 2SC2603 (E,F,C)
T501
B
AC240V 50Hz
B MODEL ONLY
5/13
4/12
3/11
8/16
PRE SCAN
FM MODE
2/10
7/15
MEMO
DOWN
1/9
6/14
BAND
UP
S309
S310
S311
S306
S301
S305
S312
S307
S314
S302
S313
S308
S304
S303
D303 DS448
D304 DS448
D305 DS448
D306 DS448
D311 DS448
D312 DS448
D310 DS448
D309 DS448
D308 DS448
D314 DS448
D313 DS448
TR502 2SD1406 (O,Y)
D503 to 506 1N4003
S501
C501 0.01
E
AC220V 50Hz
E MODEL ONLY
LP501 14V/80mA
DUAL
MHz
kHz
MONO

WARNING: ⚠ AND ▨ INDICATE SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY. REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S RECOMMENDED PARTS

AVERTISSMENT: ⚠ ET ▨, ILS INDIQUENT LES COMPOSTANTS CRITIQUES DE SÉCURITÉ, POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L' APPAREIL, NE REMPLACER QUE DES PIÈCES RECOMMANDEES PAR LE FABRICANT

RE MEASURED
UNED" MODE.

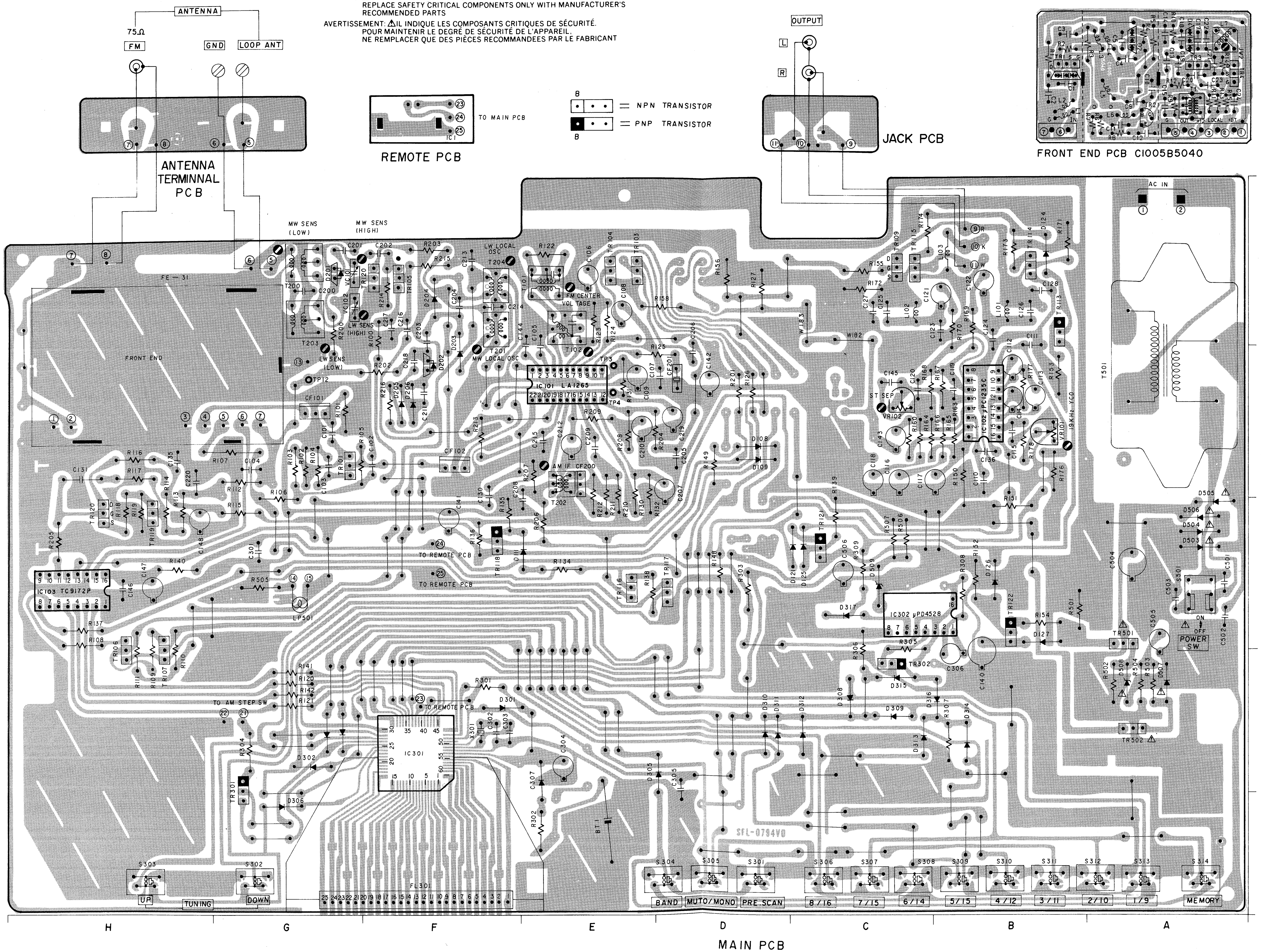
B (POWER SUPPLY) LINE
SIGNAL LINE
PLL CIRCUIT LINE

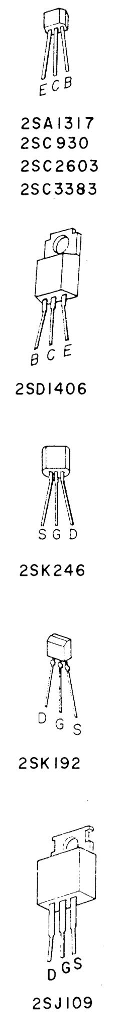
NOTE
UNLESS OTHERWISE SPECIFIED
ALL RESISTORS IN OHMS 1/6W(J)
ALL CAPACITORS IN μF 50WV(J)
POWER TRANSFORMER IS DIFFERENT
ACCORDING TO AREA

AT-M459L/M659L
CONNECTION DIAGRAM
No. AC01302D

WARNING: ⚠INDICATES SAFETY CRITICAL COMPONENTS FOR CONTINUED SAFETY,
REPLACE SAFETY CRITICAL COMPONENTS ONLY WITH MANUFACTURER'S
RECOMMENDED PARTS

AVERTISSEMENT: ⚠IL INDIQUE LES COMPOSANTS CRITIQUES DE SÉCURITÉ.
POUR MAINTENIR LE DEGRÉ DE SÉCURITÉ DE L'APPAREIL,
NE REMPLACER QUE DES PIÈCES RECOMMANDEES PAR LE FABRICANT


ANTENNA
75Ω
FM
GND
LOOP ANT
ANTENNA TERMINNAL PCB
TO MAIN PCB
IC1
REMOTE PCB
B
= NPN TRANSISTOR
= PNP TRANSISTOR
OUTPUT
L
R
JACK PCB
FRONT END PCB C1005B5040
AC IN
FE-31
FRONT END
MW SENS (LOW)
MW SENS (HIGH)
LW SENS (HIGH)
LW SENS (LOW)
LW LOCAL OSC
MW LOCAL OSC
FM CENTER VOL TAGE
AM IF
ST SEP
19KHz VCO
IC101 LA1265
IC102 μPC1223C
IC103 TC9172P
IC301
IC302 μPD4528
T501
TO REMOTE PCB
TO AM STEP SW
POWER SW
ON
OFF
SFL-0794V0
FL301
S303
S302
UP
TUNING
DOWN
S304
S305
S301
S306
S307
S308
S309
S310
S311
S312
S313
S314
BAND
MUTO/MONO
PRE.SCAN
8/16
7/15
6/14
5/15
4/12
3/11
2/10
1/9
MEMORY
H
G
F
E
D
C
B
A
1
2
3
4
5
MAIN PCB


E C B
2SA1317
2SC930
2SC2603
2SC3383
B C E
2SD1406
S G D
2SK246
D G S
2SK192
D G S
2SJ109

LOCATION OF COMPONENTS

TRANSISTORS	
TR101	G2
TR102	F1
TR103	E1
TR104	E1
TR105	F1
TR106	H3, 4
TR107	H3, 4
TR109	C1
TR113	B1
TR115	B, C1
TR116	E3
TR117	D3
TR118	F3
TR119	H3
TR120	H3
TR121	C3
TR122	B3, 4
TR301	G4, 5
TR302	C4
TR501	A3, 4
TR502	A4

IC'S	
IC1	E2
IC101	B2
IC301	F4
IC302	B, C3

INDEX

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BA-725641T	2-1C	EI-344422	3-X301	ET-349449	4-TR1		
BA-725642T	2-1B	EI-351849	1-20	ET-349449	4-TR4		
BA-725643T	2-1D	EI-351849	3-IC102	ET-349458	1-29		
BA-725644T	2-1A	EI-361624	1-16	ET-349458	3-TR105		
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BT-725479T	3-T501C	EJ-725461T	7-JM101	ET-353899	3-TR301		
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ABBREVIATIONS FOR SERVICE MANUAL

ABBREVIATION	EXPLANATION	ABBREVIATION	EXPLANATION
AFC	Auto Frequency Control	MEMO	MEMOry
AGC	Auto Gain Control	MI-COM	MIcro-COMputer
ALC	Auto Level Control	MIN	MINimum
AM	Amplitude Modulation	MIX	MIXing
AMP	AMPlifier	MPX	MultiPleX
ANT	ANTenna	MW	Medium Wave (frequency)
BATT	BATTery	NC	No Connection
BLK	BLocK	NFB	Negative Feed Back
BUFF	BUFFer	OSC	OSCillator
COMP	COMParator	PCB	Printed Circuit Board
DET	DETect (DETector)	PLL	Phase Locked Board
FLD		QD	Quadrature Detector
FM	Frequency Modulation	Rch	Right channel
FREQ	FREQuency	REF	REFerence
GND	GrouND	REG	REGulator
H	High	RF	Radio Frequency
HPF	High Pass Filter	SEG	SEGment
IF	Intermediate Frequency	SELE	SELEctor
IHF	Institute of High Fidelity	SENS	SENSitivity
IND	INDicator	SIG	SIGnal
I/O	In/Out	S/N	Signal to Noise Ratio
JW	Jumper Wire	SSG	Standard Signal Generator
L	Low	STD	STanDard
LCD	Liquid Crystal Display	SW	SWitch: Short Wave (frequency)
Lch	Left channel	THD	Total Harmonic Distortion
LED	Light Emitting Diode	TP	Test Point
LPF	Low Pass Filter	VCO	Voltage Controlled Oscillator
LW	Long Wave (Frequency)	VR	Variable Resistor
		X'TAL	Crystal

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